INSTRUCTIONS
MODEL 705/705-A ELECTRET MICROPHONE

GENERAL

The TEN-TEC Model 705 is an Electret desk microphone designed for use as a station microphone in Commercial and Amateur Radio communications and in public address and paging installations. The microphone consists of a base section and flexible gooseneck mounted microphone. The Model 705 incorporates a momentary type Push-To-Talk (PTT) button (gray), a Push-On, Push-Off locking type button (black), electronic circuitry to switch the microphone on, a signal amplifier that adds 13 dB of gain to the output level, an attached output cable and a battery compartment for a 9 volt alkaline battery. The PTT circuitry allows switching transmitters and/or transceivers, that have low voltage positive T/R lines, into the transmit mode. A light emitting diode in the base signals the transmit mode.

The Model 705 comes in two versions. The standard unit includes a four pin standard locking type cable connector which is pin compatible with TEN-TEC Models 560 and 561 Corsairs and the Model 585 Paragon. With a minor resistor change in the Corsairs (described below), the standard unit may be powered from the transceiver without the need for a 9 volt battery. The Model 705-A comes with a stereo type 1/4" phone plug. This unit is compatible with TEN-TEC Model 525 Argosy, Models 540 and 544 Tritons, Model 515 Argonaut and other early models. A 9 volt battery is required for the Model 705-A.

SPECIFICATIONS

TYPE: Electret Condenser Microphone.
SENSITIVITY: -52 dBV (0 dBV=1V/μBar @ 1 kHz).
OUTPUT IMPEDANCE: Works into any circuit of 100 ohms or more.
MAXIMUM SOUND PRESSURE LEVEL: 130 dB.
BATTERY TYPE: 9 volt Alkaline transistor battery.
ELECTRONICS: C-Mos PTT switch, C-Mos signal amplifier, NPN T/R transistor.
CURRENT REQUIRED: Receive mode: Less than 2 microamperes.
Transmit mode: 2 milliamperes typical, with 9 volt battery.
SEMICONDUCTORS: 2 ICs; 1 Transistor; 7 Diodes.
WEIGHT: 12 oz. including battery.

INSTALLATION

The standard Model 705 may be externally powered if desired. A source of 7 to 14 volts DC capable of delivering at least 5 milliamperes is required. If no external power source is contemplated, or when Model 705-A is used, a 9 volt alkaline type battery (not supplied) must be installed. The compartment, located in the base, is accessed by removing the two small screws holding the battery cover. A spring clip holds the battery and a standard connector is accessible through the opening. Proper battery installation can be checked by pushing the PTT button and observing the LED indicator. The gray button is a momentary Push-To-Talk type and the black button is a Push On-Push Off type.

The four pin connector wiring is:

Pin 1	—	White - Signal
Pin 2	—	Shield - Ground
Pin 3	—	Black - PTT Line
Pin 4	—	Plus Electret Voltage (7 to 14 VDC)

The stereo 1/4" phone connections are:

Tip	—	Black - PTT Line
Band	—	White - Signal
Sleeve	—	Shield - Ground

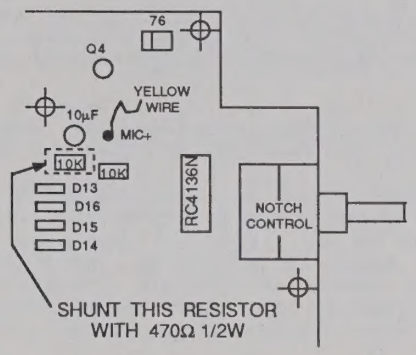
The internal NPN power transistor in the PTT circuitry has an open collector connection to the PTT lead in the output cable. Whenever the PTT button places the microphone in "Talk" mode as indicated by the LED, the transistor is turned on and the PTT lead is effectively grounded. This function can be used to key transistor transceivers "on" automatically, or may be used to close a relay that switches other types of transmitters "on", such as grid block keyed units.

CORSAIR MODIFICATION

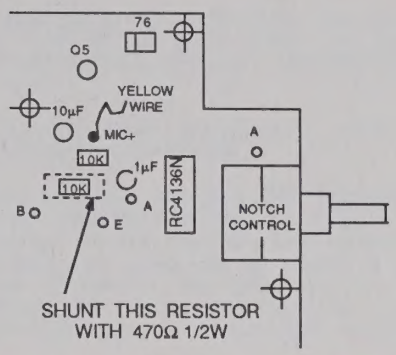
Standard Model 705 microphones may be powered from Corsair transceivers with a resistor change in the polarizing voltage circuit. All Corsair I and those Corsair II transceivers with serial numbers below 580-1970 will require this modification to eliminate use of a 9 volt battery. (These transceivers may be used without modification with the battery installed.) A 10 kohm resistor close to the terminal pin with the yellow wire, on the IF/AF assembly (see sketch), should be bridged with a 470 ohm, 1/2 watt resistor. Unfortunately, this resistor was left off of the IF/AF schematic, so it does not show up in the Corsair manual. However, it is electrically in series with the M+ (or +V) lead from Pin 4 of the Mic connector which appears in the chassis wiring diagram.

EARLY CORSAIR MODS FOR MODEL 705 MICROPHONE:

IF - AF BOARD 80984

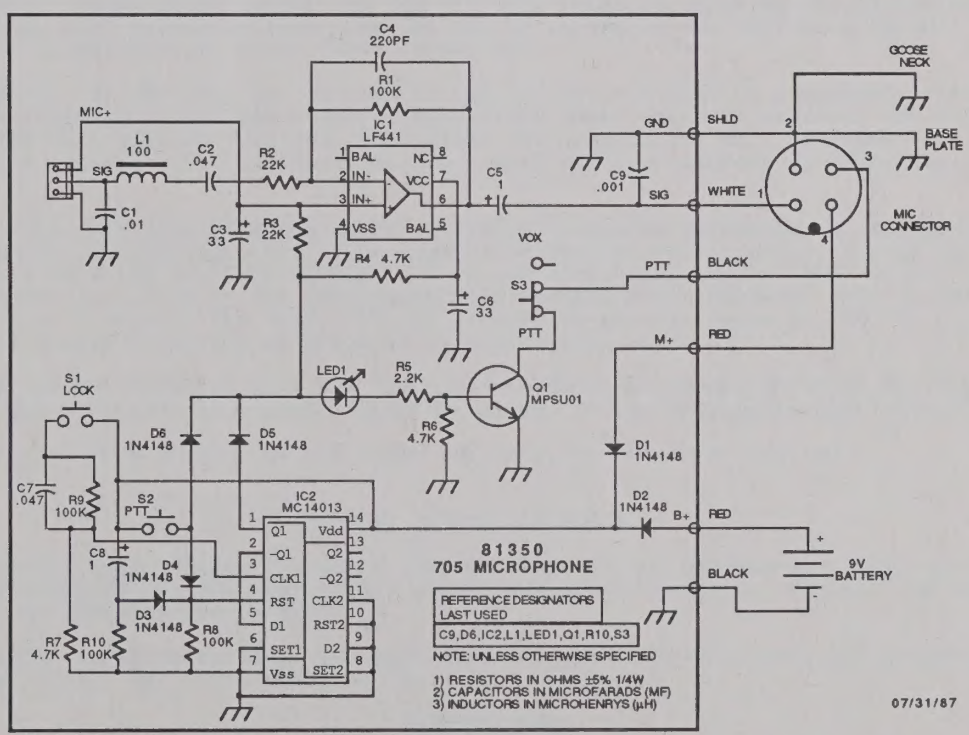


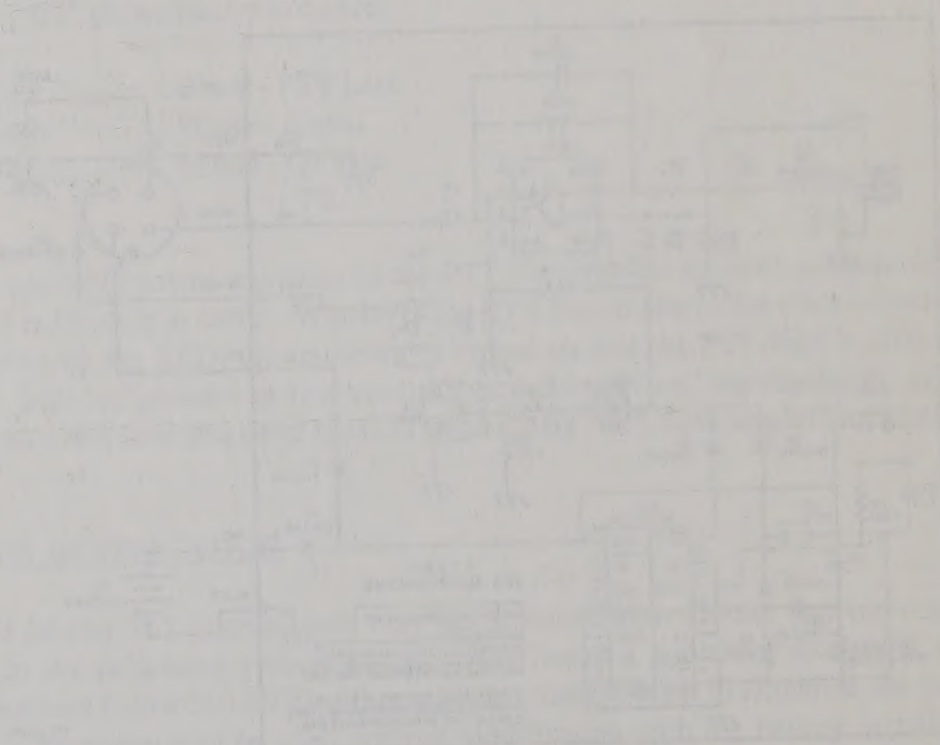
CORSAIR I



EARLY CORSAIR II (BEFORE S/N 1970)

SCHEMATIC DIAGRAM — MODEL 705





TEN-TEC, INC.
SEVIERVILLE, TN 37862

REPAIR DEPARTMENT TELEPHONE
615/428-0364

LIMITED WARRANTY AND SERVICE POLICY

GENERAL

TEN-TEC, Inc. warrants all products to be free from defects in material and workmanship for a period of one year after date of purchase, under these conditions:

1. REGISTRATION: The warranty card must be returned promptly to establish the warranty period unless otherwise stated on the card. Our card file also serves as a check on stolen equipment which may be sent in for repair. Please notify us immediately if your TEN-TEC equipment is stolen.

2. ORIGINAL PURCHASER: This warranty applies only to the original purchaser. Your warranty card listing from whom purchased establishes you as the original purchaser.

3. COMMUNICATION WITH THE FACTORY: If trouble develops, contact the TEN-TEC dealer from whom you purchased the unit. He is obligated to try to correct the malfunction or return the unit to us. If he is unable to correct the fault, you or the dealer should contact the factory by mail or by telephone (615-428-0364), giving serial number if assigned, symptoms of fault and conditions under which they appear. You will be advised whether to return the unit to us or to try a replacement plug-in assembly that will be sent to you. To facilitate service calls, please use our direct Repair Department telephone number, 615-428-0364. (NO COLLECT CALLS, PLEASE.)

4. IN-WARRANTY FIELD REPAIRS: To expedite repairs TEN-TEC will send replacement assemblies prior to receiving the suspected defective one from you. The replacement will be billed on a 30 day memo, and credit will be issued when the defective unit is returned to us. No remittance or deposit is required. If the defective assembly is not returned within 30 days, you will be billed. Unit will be shipped to you, transportation paid by TEN-TEC. Shipping charges to the factory are to be borne by you.

5. RETURN TO NON-SELLING DEALER: If you return the in-warranty unit to an authorized TEN-TEC dealer who did not sell the unit to you, he may, at his option, repair the unit or handle the return to the factory. Under these conditions TEN-TEC will repair or replace all defective components without charge, but reasonable labor charges may be levied by the servicing dealer. TEN-TEC is not liable for labor charges under these conditions.

6. PROPER DELIVERY: If the unit is returned to the factory, it must be adequately packed. A note should be included outlining the problem, conditions under which it appears, and attempted remedies. The more specific you are, the better the possibility of a complete fix. Shipping charges to the factory are to be borne by you. Unit will be returned transportation paid by TEN-TEC.

7. EXCLUSIONS: This warranty does not apply to damage caused by mishandling, lightning, voltages in excess of rating, reverse polarity of DC supply, or changes in circuits. Claims for damage in transit should be filed with the carrier. This warranty, however, is NOT voided for attempted repairs of defective units or for incorporation of additional components such as switches, etc. when there is no change in the basic circuit. Under no circumstances is TEN-TEC liable for consequantial damage to person or property by use of this unit.

8. TEN-TEC reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvement in its previously manufactured products.

9. This warranty is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF U.S.A.

1. SERVICE CENTERS: The policies listed in this warranty do not necessarily apply outside the U.S.A. Many overseas TEN-TEC dealers are qualified service centers. Contact the dealer nearest you for warranty service information.

2. TRANSPORTATION: In the event that you deal directly with TEN-TEC, Inc., all shipping charges to and from the factory are to be borne by you.

TRANSCEIVERS

1. EXTENDED PRO-RATA WARRANTY ON MODELS 546/560/561 OUTPUT TRANSISTORS: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$12.00 each	$15.00 each	$18.00 each

(Two transistors per transceiver. Labor not included.)

2. WARRANTY ON MODEL 525D OUTPUT TRANSISTORS: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike.

LINEAR AMPLIFIERS

1. MODEL 444 WARRANTY EXCEPTIONS: The Amplifier and Power Supply units are both covered under the GENERAL conditions stated above, with the following exceptions:
(A) The warranty is void if the amplifier is powered by any source other than an approved TEN-TEC power supply.
(B) The warranty is void if any of the factory sealed internal adjustments are altered.
(C) The warranty is void if any of the protective circuits are disabled.
(D) If used with other than a TEN-TEC transceiver the warranty may not apply. A list of approved transceivers is included with the amplifier. If your transceiver is not listed, contact the factory.

2. EXTENDED PRO-RATA WARRANTY ON MODEL 444 OUTPUT TRANSISTORS: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$30.00 each	$35.00 each	$40.00 each

(Four transistors per amplifier. Labor not included.)

3. PROPER DELIVERY: If the unit is returned to the factory it must be adequately packed. If the power supply section is to be returned, remove the power transformer. The transformer may be retained or returned separately as indicated.

4. MODEL 425: A different warranty sheet for Model 425 Titan is attached to the manual for that product.

OUT-OF-WARRANTY REPAIRS

1. FIELD REPAIRS: New circuit boards or discrete components can often be supplied to eliminate the cost and bother of shipping the complete unit to us. A nominal charge will be made for the material sent. Certain assemblies integral with the main chassis, such as VFO assemblies and rack tuning mechanisms, are not field replaceable.

2. RETURNED UNITS: Along with the unit, please submit a complete report on the nature of the malfunction and the conditions under which it occurs. This will enable our service department to pay special attention to your problem area and reduce overall labor costs. No matter what the malfunction is, every unit will be given a complete alignment and operational check before being returned.

3. QUOTATIONS: Quotations on repair work will be given on request, <u>after</u> examination of the unit. The amount quoted will be firm for the specific work outlined in the quotation. Should additional material or labor requirements come to light after the repair is initiated, you will be contacted for approval before this phase of the repair is started.

4. REPAIR CHARGE PAYMENT: Charges below the $25.00 level will be billed to you after completion of the work and at the time of re-shipment. A report of all work done and parts used will accompany the bill. For charges greater than $25.00, prepayment will be required before the unit is returned. One of three methods of payment may be selected. 1.) Upon completion of the work the billing will be made but the unit will be held here. Upon receipt of the payment, the unit will be shipped. 2.) The unit will be returned to you on a COD basis, with COD charges borne by you. 3.) The repair charges may be paid by either MasterCard or VISA.

Approval for COD or charge card options can be given either at the time the unit is submitted to us (in the accompanying letter) or when contacted upon completion of the repair. Please submit all raised information on your charge card when paying by this means.

5. TRANSPORTATION CHARGES: Units should be returned, transportation and insurance charges prepaid. Return transportation and insurance charges will be billed to you with other costs.

Pt. No. 74106

TEN-TEC INSTRUCTION SHEET
MODEL 645

GENERAL

Model 645 Ultramatic Keyer is a solid state, integrated circuit keyer designed for use with all TEN-TEC transceivers, but matched in color treatment with the ⊕MNI series. It incorporates transistor switching compatible with the low positive voltage key line circuits of TEN-TEC transceivers, and draws its power from the transceiver supply.

The Ultramatic design provides maximum flexibility for the discerning cw operator so that it can be set to complement your operating style and preference. Individually defeatable dit and dah memories enable the keyer to be used as a full iambic squeeze keyer or as a straight electronic keyer with or without dit memory. Weighting can be fixed light or heavy, or be made to vary as speed is changed, resulting in highest articulation and rhythm at all speeds. The paddles are pivoted on low friction ball bearings and return force is accomplished through the adjustable electro-magnetic TOUCH control. Characters are self-completing.

INSTALLATION

Carefully remove your unit from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary, they come in handy.

An attached cable with two phono plugs facilitates quick connection of the keyer to the transceiver. Phono plug connector with red sleeve into AUX 12 jack on transceiver and connector with black sleeve into KEY jack.

SPECIFICATIONS

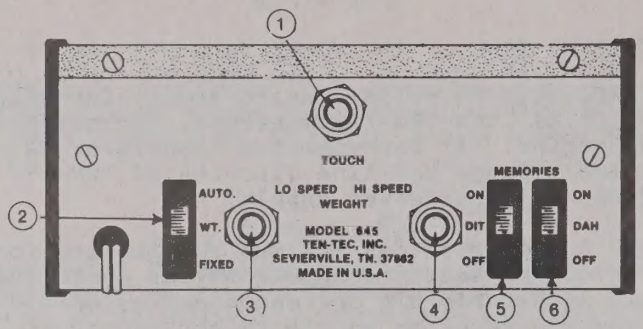
Keyed Output:	Low Voltage Positive Transistor. (Not usable with grid block or cathode keyed circuits.)
Speed Range:	6 to 50 WPM.
Time Base:	Keyed to start with paddle actuation.
Character Generation:	Self-completing dits and dahs.
Weighting Ratio Range:	50% to 150% of classical dit length. Can be pre-set for all speed settings, or be made to vary with speed.
Paddle Actuation Force:	Adjustable from 5 to 50 grams.
Memories:	Dit and dah, each individually defeatable.
Power:	9-14 VDC. 220-350 mA @ 13.5 V. 120-200 mA @ 9 V.
Semiconductors:	5 Integrated Circuits, 5 Transistors, 4 Diodes.
Size:	HWD 2-1/2" x 5-12" x 8-1/4".
Weight:	2-3/8 lbs.

OPERATION

Controls - Front Panel

SPEED:	Continuously variable between 6 and 50 WPM.
CONTACT SPACING:	Slotted screw adjustments accessible through two small holes in top of unit. Dah contacts to right, dit contacts to left. Clockwise rotation decreases spacing.

Controls and Connections - Rear Panel (Fig. 1)



1.) TOUCH: This control determines the amount of current flowing through the paddle return force electromagnets. When fully counter-clockwise, no current is applied, and the only return force is that of the gravitational pull on the contact armatures. In some cases, even this very small force is all that is required for proper paddle operation. However, if the keyer is placed on a surface other than level, or because of the small residual friction due to the bearing lubricant, operation with no magnetic current may be erratic. It is recommended therefore that at least a small amount of clockwise rotation of the TOUCH control be used, enough to insure consistent keying.

2,3,4.) WT Switch and LO and HI SPEED Adjustments: The WT switch selects between automatic (AUTO) or FIXED weighting operation. LO SPEED control increases weighting, and HI SPEED control decreases it.

Before proceeding with set-up instructions for these controls, let us take a moment to define several of the terms used. As given in the ARRL Handbook, the basic code element is the dot, or unit time pulse. By using this time element as the unit by which we measure all other code characteristics, our definitions will be independent of code speed since we are talking of ratios and not actual time spans. What is referred to as "classical" code, then, is a dot length equal to one time element, a space between characters also equal to one time element, a dash equal to three units, and the space between letters equal to three units. For our discussion, let us define this unit classical dot as one bit. If we have what is called a heavily weighted character, we have a dit that is somewhat longer than one bit and a dah somewhat longer than three bits. Conversely, a lightly weighted character is a dit somewhat less than one bit in length and a dah somewhat less than three bits. Keep in mind that the space between characters is not changed when defining heavily and lightly weighted characters. (It can be seen that if a dit is weighted heavily enough, it can become a classical dah, and if a dah is weighted lightly enough, it becomes a dit. However, we do not deal in such large amounts of weighting.) We define the amount of weighting as the percent of a classical dit, with classical dit being 100%. Therefore, a dit length equal to one half of a classical dit, or one half of a bit, would be weighted 50% and a heavily weighted dit equal to one and one half bits in length as a 150% dit.

Since most modern keyers operate from a time base oscillator whose speed is constant for a given setting of the SPEED control, an increase in the dit weighting will be accompanied by a shortening of the space after the dit, so as to maintain this constant speed. And since these keyers construct a dah by adding two dits and the space between them together, we can see that the weighted dah will be lengthened or shortened from the classical three bits, but to a lesser degree than the dit. In the case of our 150% dit, equal to 1-1/2 bits, the equivalent dah will be 3-1/2 bits long instead of the classical three bits. This is a lengthening of only 17%, one third as much as the dit.

It is generally agreed that slowly sent classical code sounds a bit choppy. Weighting on the heavy side provides a more rhythmic sound. Conversely, high speed classical code tends to run together making copying more difficult. Lightly weighted code in these instances is more clearily defined, since the dits are sharper pulses which come through more articulately.

With these factors in mind, we can proceed to set up the weighting controls. Make all adjustments while sending a string of dits. If you do not change your sending speed very much from contact to contact, the fixed weighting mode would complement your operating style. Set the WT switch to the FIXED position. With both LO and HI SPEED controls fully counter-clockwise, the weighting will be approximately at the classical setting. If weighting heavier than this is desired, rotate the LO SPEED control clockwise while sending a string of dits until the desired sound is acheived. If light weighting is desired, rotate the HI SPEED control clockwise. The setting so arrived at will be maintained no matter where the SPEED control is set. In the FIXED mode, only one or the other of the controls should be advanced from the full CCW positions. NOTE: It is possible that too much weighting is available at the clockwise control extremes which will lock the keyer on or off completely. If the keyer seems to be in a locked mode, turn both weight controls fully CCW and start weight adjustment again.

If your sending style is to change speeds to match that of the station being worked, and the variable weighting feature of Model 645 is desired, set the WT switch to the AUTO position. As a starting point, set both LO and HI controls fully CCW. Adjust the SPEED control to the lowest speed you wish to work. If heavier weighting is desired, advance the LO SPEED control as needed. If you prefer a light weighting, advance the HI SPEED control. Now readjust the SPEED control to the fastest speed you expect to work. If your low speed adjustment was made with the LO SPEED control, set the HI SPEED control for the desired weight. If the low speed adjustment was made with the HI SPEED control, you only need to check operation at the fast speed, since weighting will already lighten at the fast speed. If the weighting change between your low and fast speeds is not suitable, the HI SPEED control should be reset to a position where the range is acceptable. If the low speed knob setting of the SPEED control is more than half rotation, i.e. to the right of the 12 o'clock position, recheck the low speed weighting since there is some interaction between the controls when the SPEED control is not at its extremes. NOTE: In some instances, where your slow and fast speed limits are a small part of the complete SPEED control range and where the weighting controls are advanced to near full clockwise rotation, you may find that the weighting is so extreme at the low and high speed limits that the keyer will lock on or off at these extremes. This is normal and is of no concern, since operation at these speeds is not contemplated.

Since weighting preference is a personal factor, and is the result of what sounds best to you, setting the controls while listening to the code is suggested.

5). DIT MEMORY: This switch determines whether the dit memory is inserted in the circuit or not. In the ON position, a dit can be programed to follow any dah, in correct spacing and sequence, if the dit paddle is momentarily actuated while a dah is being sent. Dits can be inserted between a string of dahs without releasing the dah paddle. For example, in sending the letter Q, the dah paddle is depressed and held. During the sending of the second dah, the dit paddle is actuated just momentarily. When you hear the third dah starting, after the dit ends, release the dah paddle, and the Q will be

generated perfectly. Other letters, such as Y, K, and G can similarly make use of the dit memory and insertion technique. With DIT MEMORY on and the DAH MEMORY off, actuating both paddles simultaneously will result in a string of dits being generated. If the dah paddle is actuated a little before the dit paddle, a dah followed by a string of dits will result.

With the DIT MEMORY switch in the off position, the only time a dit can be sent is when the keyer is not generating dahs.

6.) DAH MEMORY: This memory is similar in operation to the dit memory. Dahs can be inserted between a string of dits, and such letters as F,L,U,V and R can use this technique.

Iambic Squeeze Keying - If both dit and dah memories are used, the keyer will perform as an iambic squeeze keyer. By actuating both paddles simultaneously, the memories will alternately program in dits and dahs so that a string of dit-dahs results. If the dit paddle is depressed a bit before the dah paddle, the string will start with a dit; if the dah paddle is actuated first, the string will start with a dah. Such letters as A,C,K,N, and R can be formed with one squeeze motion of the fingers. Other letters such as F,L,Q and Y can utilize the insertion technique as outlined above for reduced hand motions and easier sending of more perfect code.

CIRCUIT DESCRIPTION

Referring to the block diagram and plug-in assembly schematic, Q1, Q2 and Q3 constitute a timing oscillator whose frequency is determined by C1 and the series combination of R1 and SPEED potentiometer, R23B. The oscillator is switched on and off from logic circuitry signals feed to the emitter of Q1 via gate 4-1. At the instant Q1 is turned on, C1 discharges immediately through transistors Q2 and Q3. The voltage at the collector of Q1 drops from a high to low state and linearily starts to charge back to the high state. The initial drop in this voltage is passed on to the base of Q4 through the weighting resistance network, R23A, R20, R22 and R19. Q4 turns off which in turn turns gate 4-4 on. The low state of this gate is passed on to the driver transistor, Q5 through D1, shorting the key line. This state remains until the ramp voltage on the base of Q4 reaches the turn-on level for this transistor, which then causes gate 4-4 to change state. In turn, the output of gate 4-3 goes low, providing flip-flop, IC-5, is not keeping the input voltage low through D2. This is the case if a dit was sent. If a dah was initiated, IC-5 would have been enabled through a logic signal applied to the set terminal, pin 8, and the key line would remain low due to pin 10 becoming low. The dah logic would also keep the oscillator running. A reset pulse is generated at the base of Q2 and applied through gate 4-2 to the logic so that the circuit reverts to the initial state after completion of the character. Basically, the timing oscillator applies the dit pulse to the key line driver and the dah is formed by having the oscillator send two dits to the driver transistor with the flip-flop IC filling in the space between the two dits.

The length of the dit, hence its weighted value, is determined by selecting the voltage along the ramp voltage at which Q4 starts to conduct. The potentiometers in the weighting network serve to select this variable, and through coupling of this network to the SPEED control, the variable weighting function is achieved. For fixed weighting, the WT switch shorts potentiometer, R23A.

Power of 5 VDC for the keyer is developed through zener diode D3 and series resistors R13 and R14.

INCREASING MAXIMUM SPEED

To increase the maximum speed of Model 645 to a value higher than 50 WPM, replace R1 on the PC assembly with a resistor of lesser value. A 2.7K resistor will increase the maximum to approximately 90 WPM. Values between 4.7K and 2.7K will affect the speed in between 50 and 90 WPM. The lowest speed of about 6 WPM will not be materially affected by this change. The increased speed range resulting from this modification may be somewhat more difficult to adjust accurately. To compensate for this, you may wish to increase the minimum speed as detailed below.

INCREASING MINIMUM SPEED

To increase the minimum speed at full CCW setting of the SPEED control, R23B may be shunted with an appropriate resistor from wiper terminal to ground. A 27K resistor shunting the control will increase the slowest speed from 6 to approximately 9 WPM. It is not recommended that too severe a change in minimum speed be attempted if the AUTO weighting feature is used. Shunting the speed potentiometer with a fixed resistor changes the taper of the control, and since the auto weighting circuit gangs two potentiometers together, the tracking of weight change from low to high speed will be affected. If fixed weighting is used, the minimum speed modification will not affect weighting, and any amount of change can be accommodated. R23B is the front section of the dual SPEED control.

PADDLE CARE

Even though the mechanical paddle suspension system of the 645 is rugged, reasonable care should be taken to preserve the delicate feel and fine performance capable from the unit. The ball bearings are hardened steel, but because of the very small displacements encountered, a sharp blow to the paddle may cause the balls to deform slightly, or cause the aluminum shaft to become loose from the bearing assembly. A good test of freeness in the system is to turn the TOUCH control fully CCW. Then by turning the keyer first vertically one way and then the other, the gravitational pull created by the paddles being eccentric to the shafts should be enough to key the keyer on in both positions -- dits in one and dahs in the other. (The approximate torque force on the shafts under this test is 4 grams at the center of the paddle finger area.)

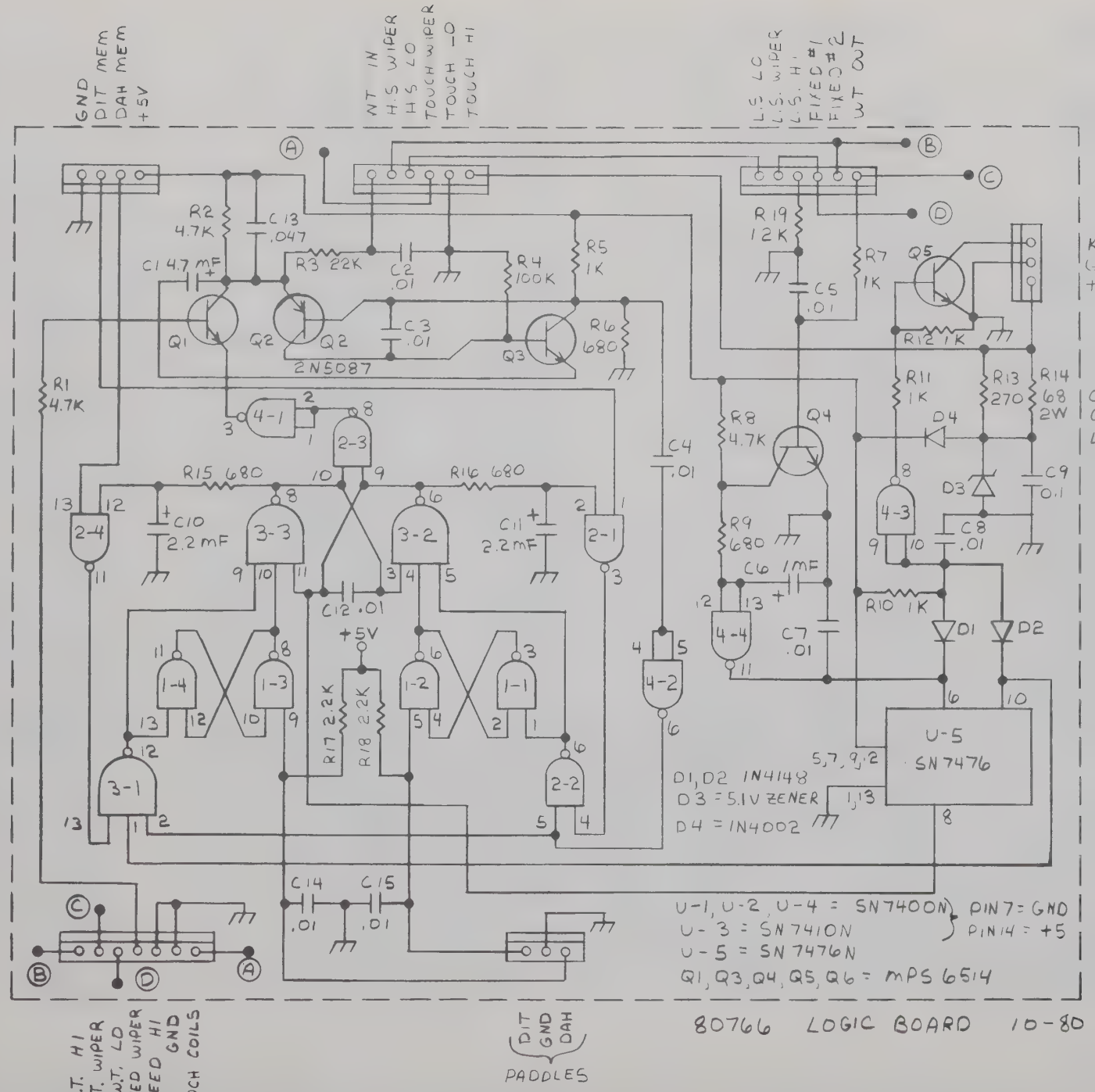
The ball bearings should not be lubricated at any time. Factory lubrication should last the lifetime of the keyer.

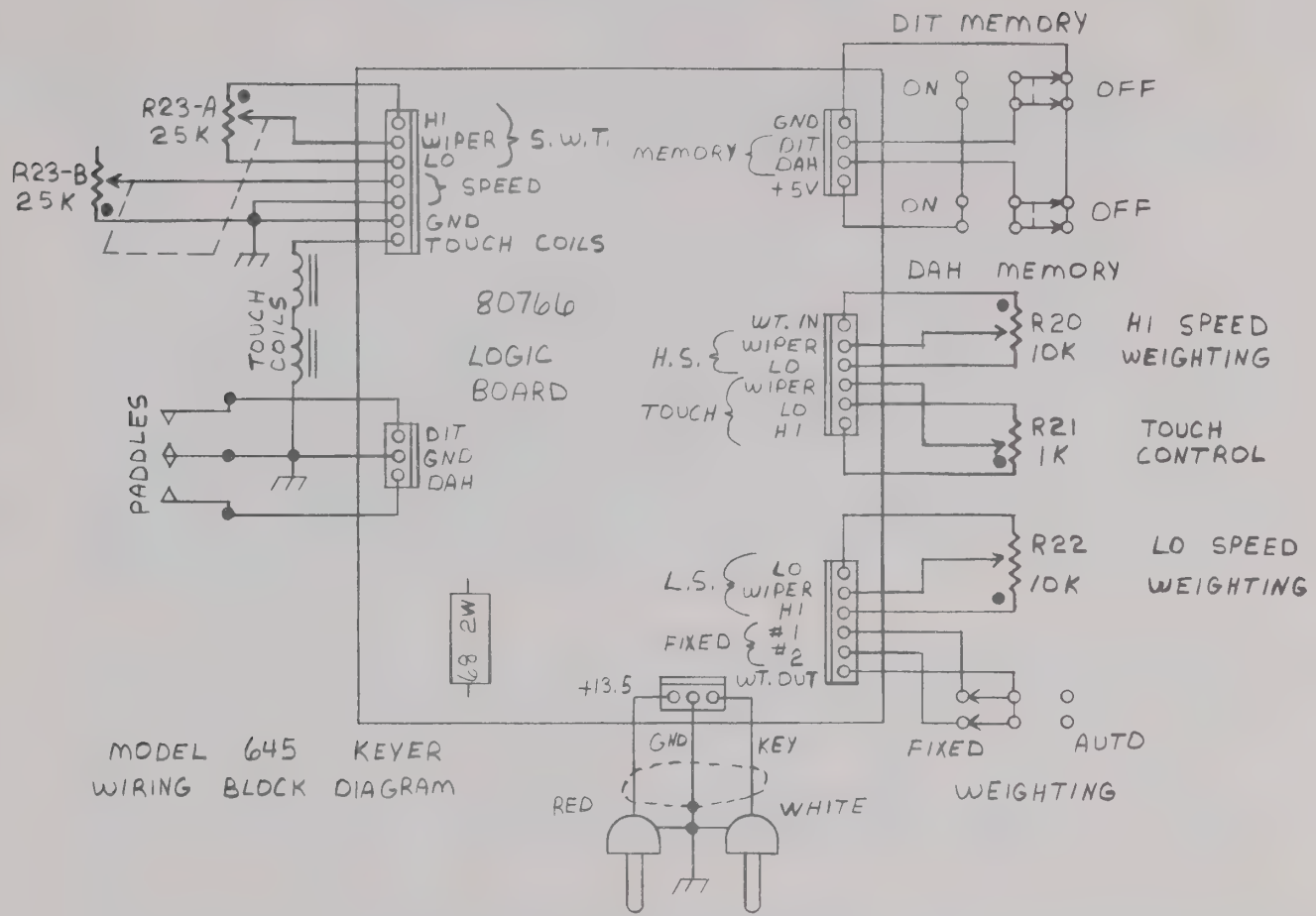
LEFT-HANDED CW OPERATORS

If you wish to switch the dit and dah paddles, remove the top of the unit and locate the brown and violet wires on the PC socket. Unsolder these two leads and interchange them. Resolder and reassemble the keyer.

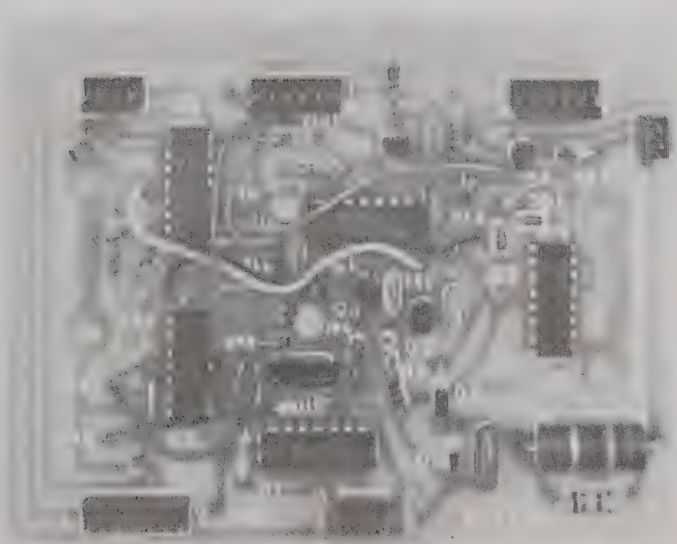
PC BOARD ORIENTATION

The PC assembly constitutes most of the circuitry, with the exception of controls, switches, and paddle assembly. It contains all logic, timing oscillator and power supply components. Orientation is such that the one large resistor lies to the right front of the keyer when PC assembly board is properly mounted. All connections to the LOGIC BOARD are through plug-in mass termination connectors.


GND
DIT MEM
DAH MEM
+5V
NT IN
H.S WIPER
H.S LO
TOUCH WIPER
TOUCH -O
TOUCH HI
L.S LO
L.S. WIPER
L.S. HI
FIXED #1
FIXED #2
WT OUT
KEY
GND
+13.5 VDC IN
DOUBLE LINE ON MASS TERM CONNECTOR DENOTES LOCKING TAB
R1 4.7K
R2 4.7K
C13 .047
C1 4.7 mF
R3 22K
C2 .01
R4 100K
R5 1K
C3 .01
Q1
Q2
Q2 2N5087
Q3
R6 680
R19 12K
C5 .01
R7 1K
Q5
R12 1K
R11 1K
R13 270
R14 68 2W
R8 4.7K
Q4
D4
C4 .01
R15 680
R16 680
C10 2.2 mF
C11 2.2 mF
C12 .01
D3
C9 0.1
C8 .01
R9 680
C6 1MF
C7 .01
R10 1K
D1
D2
+5V
R17 2.2K
R18 2.2K
U-5 SN7476
D1, D2 IN4148
D3 = 5.1V ZENER
D4 = IN4002
C14 .01
C15 .01
U-1, U-2, U-4 = SN7400N
U-3 = SN7410N
U-5 = SN7476N
Q1, Q3, Q4, Q5, Q6 = MPS 6514
PIN 7 = GND
PIN 14 = +5
SW.T. HI
SW.T. WIPER
SW.T. LO
SPEED WIPER
SPEED HI
GND
TOUCH COILS
DIT
GND
DAH
PADDLES
80766 LOGIC BOARD 10-80



MODEL 645 KEYER WIRING BLOCK DIAGRAM



TEN-TEC, INC.
Sevierville, TN 37862

REPAIR DEPARTMENT TELEPHONE
~~615~~ 423-0364
865

LIMITED WARRANTY AND SERVICE POLICY

GENERAL

TEN-TEC, Inc. warrants all products to be free from defects in material and workmanship for a period of one year after date of purchase, under these conditions:

1.) Registration: The warranty card must be returned promptly to establish the warranty period unless otherwise stated on the card. Our card file also serves as a check on stolen equipment which may be sent in for repair. Please notify us immediately if your TEN-TEC equipment is stolen.

2.) Original Purchaser: This warranty applies only to the original purchaser. Your warranty card listing from whom purchased establishes you as the original purchaser.

3.) Communication with the Factory: If trouble develops, contact the TEN-TEC dealer from whom you purchased the unit. He is obligated to try to correct the malfunction or return the unit to us. If he is unable to correct the fault, you or the dealer should contact the factory by mail or by telephone (615-428-0364), giving serial number if assigned, symptoms of fault and conditions under which they appear. You will be advised whether to return the unit to us or to try a replacement plug-in assembly that will be sent to you. To facilitate service calls, please use our direct Repair Department telephone number, 615-428-0364. (NO COLLECT CALLS, PLEASE.)

4.) In-Warranty Field Repairs: To expedite repairs TEN-TEC will send replacement assemblies prior to receiving the suspected defective one from you. The replacement will be billed on a 30 day memo, and credit will be issued when the defective unit is returned to us. No remittance or deposit is required. If the defective assembly is not returned within 30 days, you will be billed. Unit will be shipped to you, transportation paid by TEN-TEC. Shipping charges to the factory are to be borne by you.

5.) Return to Non-Selling Dealer: If you return the in-warranty unit to an authorized TEN-TEC dealer who did not sell the unit to you, he may, at his option, repair the unit or handle the return to the factory. Under these conditions TEN-TEC will repair or replace all defective components without charge, but reasonable labor charges may be levied by the servicing dealer. TEN-TEC is not liable for labor charges under these conditions.

6.) Proper Delivery: If the unit is returned to the factory, it must be adequately packed. A note should be included outlining the problem, conditions under which it appears, and attempted remedies. The more specific you are, the better the possibility of a complete fix. Shipping charges to the factory are to be borne by you. Unit will be returned transportation paid by TEN-TEC.

7.) Exclusions: This warranty does not apply to damage caused by mishandling, lightning, voltages in excess of rating, reverse polarity of DC supply, or changes in circuits. Claims for damage in transit should be filed with the carrier. This warranty, however, is NOT voided for attempted repairs of defective units or for incorporation of additional components such as switches, etc. when there is no change in the basic circuit. Under no circumstances is TEN-TEC liable for consequential damage to person or property by use of this unit.

8.) TEN-TEC reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvements in its previously manufactured products.

9.) This warranty is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF U.S.A.

1.) Service Centers: The policies listed in this warranty do not necessarily apply outside the U.S.A. Many overseas TEN-TEC dealers are qualified service centers. Contact the dealer nearest you for warranty service information.

2.) Transportation: In the event that you deal directly with TEN-TEC, Inc., all shipping charges to and from the factory are to be borne by you.

TRANSCEIVERS

1.) Extended Pro-Rata Warranty on Models 546/580 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$12.00 each	$15.00 each	$18.00 each

(Two transistors per transceiver. Labor not included.)

2.) Warranty on Models 515/570 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike.

LINEAR AMPLIFIERS

1.) Model 444 Warranty Exceptions: The Amplifier and Power Supply units are both covered under the GENERAL conditions stated above, with the following exceptions:
   A.) The warranty is void if the amplifier is powered by any source other than an approved TEN-TEC power supply.
   B.) The warranty is void if any of the factory sealed internal adjustments are altered.
   C.) The warranty is void if any of the protective circuits are disabled.
   D.) If used with other than a TEN-TEC transceiver the warranty may not apply. A list of approved transceivers is included with the amplifier. If your transceiver is not listed, contact the factory.

2.) Extended Pro-Rata Warranty on Model 444 Output Transistors: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$25.00 each	$30.00 each	$35.00 each

(Four transistors per amplifier. Labor not included.)

3.) Proper Delivery: If the unit is returned to the factory it must be adequately packed. If the power supply section is to be returned, remove the power transformer. The transformer may be retained or returned separately as indicated.

OUT-OF-WARRANTY REPAIRS

1.) Field Repairs: New circuit boards or discrete components can often be supplied to eliminate the cost and bother of shipping the complete unit to us. A nominal charge will be made for the material sent. Certain assemblies integral with the main chassis, such as VFO assemblies and rack tuning mechanisms, are not field replaceable.

2.) Returned Units: Along with the unit, please submit a complete report on the nature of the malfunction and the conditions under which it occurs. This will enable our service department to pay special attention to your problem area and reduce overall labor costs. No matter what the malfunction is, every unit will be given a complete alignment and operational check before being returned.

3.) Quotations: Quotations on repair work will be given on request, after examination of the unit. The amount quoted will be firm for the specific work outlined in the quotation. Should additional material or labor requirements come to light after the repair is initiated, you will be contacted for approval before this phase of the repair is started.

4.) Repair Charge Payment: Charges below the $25.00 level will be billed to you after completion of the work and at the time of re-shipment. A report of all work done and parts used will accompany the bill. For charges greater than $25.00, prepayment will be required before the unit is returned. One of three methods of payment may be selected. 1.) Upon completion of the work the billing will be made but the unit will be held here. Upon receipt of the payment, the unit will be shipped. 2.) The unit will be returned to you on a COD basis, with COD charges borne by you. 3.) The repair charges may be paid by either MasterCharge or VISA.
   Approval for COD or charge card options can be given either at the time the unit is submitted to us (in the accompanying letter) or when contacted upon completion of the repair. Please submit all raised information on your charge card when paying by this means.

5.) Transportation Charges: Units should be returned, transportation and insurance charges prepaid. Return transportation and insurance charges will be billed to you with other costs.

GENERAL INSTRUCTIONS
TEN-TEC TRITON IV ACCESSORIES

Service Note SN-1-540

When using TRITON IV accessories that plug into the ACCESSORIES socket on the rear panel of the unit, several procedures should be followed, especially when more than one accessory are used in the station set-up. The order in which the accessories are serially connected, and the required jumpers and their location, be it on a dummy plug or in one of the cable connectors, are outlined below for all possible combinations. Accessories requiring these procedures are:

Model 240 One-Sixty Converter
Model 241 Crystal Oscillator
Model 242 External VFO
Model 244 Digital Readout

In order to simplify these procedures and instructions, it is recommended that the VFO modification detailed below be made, even though the external VFO, Model 242, is not incorporated at this time. This modification will not affect the operation of any other accessory, provided that the jumpers in the accessories used are changed to agree with the information given in this Service Note. TRITON IVs with Serial Numbers greater than 1400 already have this modification.

VFO MODIFICATION

This modification is necessary when using the external VFO, Model 242, so that the instant break-in feature of the TRITON system is maintained. Even though Model 242 may not be used at this time, performing the modification now will eliminate further alterations to the jumper positions in the future, and will bring TRITONs with S.N. below 1400 up to present day status. Modified units should be so noted by applying the adhesive label supplied to the TRITON rear panel near the ACCESSORIES socket.

1.) Remove top and bottom plates from TRITON IV.

2.) Remove SSB GEN. assembly, 80282, and bend fibre insulator up to expose cables underneath.

3.) Unsolder the three red wires that are attached to the thru-terminal on the right top side of the VFO compartment. This terminal is the one farthest to the rear of the TRITON and is the +12 volt line.

4.) Locate the one red wire that runs to the 47 ohm resistor on the terminal strip near the meter lamp. Clip this wire from the resistor.

5.) Work the remaining two wires back through the harness ties to where they emerge from under the CONTROL BOARD assembly.

6.) Twist these two leads and dress them to the 47 ohm resistor lug just mentioned. Solder.

7.) Unsolder the orange lead from the center VFO thru-terminal and resolder it to the one that had the three red leads. (This lead goes to pin 5 of the ACCESSORIES socket.)

8.) Take the discarded red lead and solder it between the center thru-terminal on the VFO compartment and the second terminal lug from the right on the front PC socket for the SSB GEN. assembly. This lug is the + regulated line and should already have an orange and a white lead in place.

9.) Lay fibre insulator back down and replace SSB GEN. assembly.

10.) Remove top plate of VFO compartment.

11.) Locate and remove red wire running from rear thru-terminal to PC assembly inside of compartment.

12.) Solder one millihenry choke between these two points. Replace top and turn TRITON over.

13.) In bottom section of VFO compartment locate and unsolder white wire going to wafer switch mounted on rear inside compartment surface.

14.) Resolder this lead to the solder dot on the center switch wafer immediately opposite the lug just vacated. In other words, transfer this lead from the rear wafer to the corresponding lug of the center wafer.

15.) With a piece of bare hook-up wire about 3/4" long, jumper the vacated lug on the rear wafer to either adjacent lug with green leads already attached. Turn TRITON right side up.

Due to the added current drain through pin 2 of the ACCESSORIES socket when several accessories are used, the voltage drop and power loss of L1, the small choke in series with the +12volt line may become excessive. The following steps rewire the circuit so that pin 2 of the socket goes directly to the power supply line instead of through L1.

16.) Locate the red lead going from pin 2 of the ACCESSORIES socket to the top lug of the four lug terminal strip mounted on the chassis side near the socket. Unsolder only this lead at the terminal lug location.

17.) Resolder this lead to the fuse post body terminal, the one with the heavy red lead going to the final amplifier assembly.

18.) Again referring to pin 2 of the ACCESSORIES socket, locate the second red lead soldered to it -- the one going through the chassis grommet to the bottom side of the chassis. Unsolder only this lead from pin 2 and feed it back through the cable tie to gain additional free length.

19.) Re-route the lead under the socket to the top lug of the terminal strip and solder.

20.) Replace top and bottom plates. Affix label noting mod. change to rear panel.

21.) If dummy plug for socket has jumper between pins 4 and 5, remove and jumper pins 2 and 5.

NOTE: To determine whether an existing TRITON IV has the VFO modification, slide back the top plate and note the wires going to the VFO thru-terminals. If a single orange lead is connected to the rear-most terminal, the modification has been made. If there are three red wires at this terminal, the modification has not been made.

IT IS VERY IMPORTANT FOR PROPER VFO OPERATION THAT PINS 4 AND 5 OF DUMMY PLUG BE JUMPERED IF MODIFICATION IS NOT INCORPORATED AND PINS 2 AND 5 IF MODIFICATION IS MADE. FAILURE TO COMPLY WILL RESULT IN UNSTABLE VFO PERFORMANCE.

INTERCONNECTING ACCESSORIES

The table below shows all possible accessory combinations that are workable as a system, the jumpers required and their location. When two or three accessories are used together, serially connect them in the same order as listed. Models 241 and 242 and Models 241 and 244 cannot be used together.

Pt. No. 74106

TEN-TEC INSTRUCTION SHEET
MODEL 645

GENERAL

Model 645 Ultramatic Keyer is a solid state, integrated circuit keyer designed for use with all TEN-TEC transceivers, but matched in color treatment with the ⊕MNI series. It incorporates transistor switching compatible with the low positive voltage key line circuits of TEN-TEC transceivers, and draws its power from the transceiver supply.

The Ultramatic design provides maximum flexibility for the discerning cw operator so that it can be set to complement your operating style and preference. Individually defeatable dit and dah memories enable the keyer to be used as a full iambic squeeze keyer or as a straight electronic keyer with or without dit memory. Weighting can be fixed light or heavy, or be made to vary as speed is changed, resulting in highest articulation and rhythm at all speeds. The paddles are pivoted on low friction ball bearings and return force is accomplished through the adjustable electro-magnetic TOUCH control. Characters are self-completing.

INSTALLATION

Carefully remove your unit from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary, they come in handy.

An attached cable with two phono plugs facilitates quick connection of the keyer to the transceiver. Phono plug connector with red sleeve into AUX 12 jack on transceiver and connector with black sleeve into KEY jack.

SPECIFICATIONS

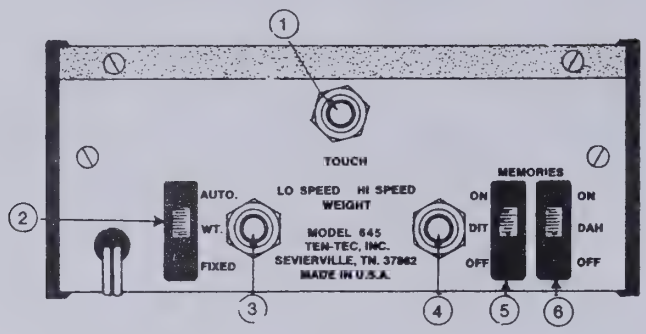
Keyed Output:	Low Voltage Positive Transistor. (Not usable with grid block or cathode keyed circuits.)
Speed Range:	6 to 50 WPM.
Time Base:	Keyed to start with paddle actuation.
Character Generation:	Self-completing dits and dahs.
Weighting Ratio Range:	50% to 150% of classical dit length. Can be pre-set for all speed settings, or be made to vary with speed.
Paddle Actuation Force:	Adjustable from 5 to 50 grams.
Memories:	Dit and dah, each individually defeatable.
Power:	9-14 VDC. 220-350 mA @ 13.5 V. 120-200 mA @ 9 V.
Semiconductors:	5 Integrated Circuits, 5 Transistors, 4 Diodes.
Size:	HWD 2-1/2" x 5-12" x 8-1/4".
Weight:	2-3/8 lbs.

OPERATION

Controls - Front Panel

SPEED:	Continuously variable between 6 and 50 WPM.
CONTACT SPACING:	Slotted screw adjustments accessible through two small holes in top of unit. Dah contacts to right, dit contacts to left. Clockwise rotation decreases spacing.

Controls and Connections - Rear Panel (Fig. 1)



1.) TOUCH: This control determines the amount of current flowing through the paddle return force electromagnets. When fully counter-clockwise, no current is applied, and the only return force is that of the gravitational pull on the contact armatures. In some cases, even this very small force is all that is required for proper paddle operation. However, if the keyer is placed on a surface other than level, or because of the small residual friction due to the bearing lubricant, operation with no magnetic current may be erratic. It is recommended therefore that at least a small amount of clockwise rotation of the TOUCH control be used, enough to insure consistent keying.

2,3,4.) WT Switch and LO and HI SPEED Adjustments: The WT switch selects between automatic (AUTO) or FIXED weighting operation. LO SPEED control increases weighting, and HI SPEED control decreases it.

Before proceeding with set-up instructions for these controls, let us take a moment to define several of the terms used. As given in the ARRL Handbook, the basic code element is the dot, or unit time pulse. By using this time element as the unit by which we measure all other code characteristics, our definitions will be independent of code speed since we are talking of ratios and not actual time spans. What is referred to as "classical" code, then, is a dot length equal to one time element, a space between characters also equal to one time element, a dash equal to three units, and the space between letters equal to three units. For our discussion, let us define this unit classical dot as one bit. If we have what is called a heavily weighted character, we have a dit that is somewhat longer than one bit and a dah somewhat longer than three bits. Conversely, a lightly weighted character is a dit somewhat less than one bit in length and a dah somewhat less than three bits. Keep in mind that the space between characters is not changed when defining heavily and lightly weighted characters. (It can be seen that if a dit is weighted heavily enough, it can become a classical dah, and if a dah is weighted lightly enough, it becomes a dit. However, we do not deal in such large amounts of weighting.) We define the amount of weighting as the percent of a classical dit, with classical dit being 100%. Therefore, a dit length equal to one half of a classical dit, or one half of a bit, would be weighted 50% and a heavily weighted dit equal to one and one half bits in length as a 150% dit.

Since most modern keyers operate from a time base oscillator whose speed is constant for a given setting of the SPEED control, an increase in the dit weighting will be accompanied by a shortening of the space after the dit, so as to maintain this constant speed. And since these keyers construct a dah by adding two dits and the space between them together, we can see that the weighted dah will be lengthened or shortened from the classical three bits, but to a lesser degree than the dit. In the case of our 150% dit, equal to 1-1/2 bits, the equivalent dah will be 3-1/2 bits long instead of the classical three bits. This is a lengthening of only 17%, one third as much as the dit.

It is generally agreed that slowly sent classical code sounds a bit choppy. Weighting on the heavy side provides a more rhythmic sound. Conversely, high speed classical code tends to run together making copying more difficult. Lightly weighted code in these instances is more clearily defined, since the dits are sharper pulses which come through more articulately.

With these factors in mind, we can proceed to set up the weighting controls. Make all adjustments while sending a string of dits. If you do not change your sending speed very much from contact to contact, the fixed weighting mode would complement your operating style. Set the WT switch to the FIXED position. With both LO and HI SPEED controls fully counter-clockwise, the weighting will be approximately at the classical setting. If weighting heavier than this is desired, rotate the LO SPEED control clockwise while sending a string of dits until the desired sound is acheived. If light weighting is desired, rotate the HI SPEED control clockwise. The setting so arrived at will be maintained no matter where the SPEED control is set. In the FIXED mode, only one or the other of the controls should be advanced from the full CCW positions. NOTE: It is possible that too much weighting is available at the clockwise control extremes which will lock the keyer on or off completely. If the keyer seems to be in a locked mode, turn both weight controls fully CCW and start weight adjustment again.

If your sending style is to change speeds to match that of the station being worked, and the variable weighting feature of Model 645 is desired, set the WT switch to the AUTO position. As a starting point, set both LO and HI controls fully CCW. Adjust the SPEED control to the lowest speed you wish to work. If heavier weighting is desired, advance the LO SPEED control as needed. If you prefer a light weighting, advance the HI SPEED control. Now readjust the SPEED control to the fastest speed you expect to work. If your low speed adjustment was made with the LO SPEED control, set the HI SPEED control for the desired weight. If the low speed adjustment was made with the HI SPEED control, you only need to check operation at the fast speed, since weighting will already lighten at the fast speed. If the weighting change between your low and fast speeds is not suitable, the HI SPEED control should be reset to a position where the range is acceptable. If the low speed knob setting of the SPEED control is more than half rotation, i.e. to the right of the 12 o'clock position, recheck the low speed weighting since there is some interaction between the controls when the SPEED control is not at its extremes. NOTE: In some instances, where your slow and fast speed limits are a small part of the complete SPEED control range and where the weighting controls are advanced to near full clockwise rotation, you may find that the weighting is so extreme at the low and high speed limits that the keyer will lock on or off at these extremes. This is normal and is of no concern, since operation at these speeds is not contemplated.

Since weighting preference is a personal factor, and is the result of what sounds best to you, setting the controls while listening to the code is suggested.

5). DIT MEMORY: This switch determines whether the dit memory is inserted in the circuit or not. In the ON position, a dit can be programed to follow any dah, in correct spacing and sequence, if the dit paddle is momentarily actuated while a dah is being sent. Dits can be inserted between a string of dahs without releasing the dah paddle. For example, in sending the letter Q, the dah paddle is depressed and held. During the sending of the second dah, the dit paddle is actuated just momentarily. When you hear the third dah starting, after the dit ends, release the dah paddle, and the Q will be

generated perfectly. Other letters, such as Y, K, and G can similarily make use of the dit memory and insertion technique. With DIT MEMORY on and the DAH MEMORY off, actuating both paddles simultaneously will result in a string of dits being generated. If the dah paddle is actuated a little before the dit paddle, a dah followed by a string of dits will result.

With the DIT MEMORY switch in the off position, the only time a dit can be sent is when the keyer is not generating dahs.

6.) DAH MEMORY: This memory is similar in operation to the dit memory. Dahs can be inserted between a string of dits, and such letters as F,L,U,V and R can use this technique.

Iambic Squeeze Keying - If both dit and dah memories are used, the keyer will perform as an iambic squeeze keyer. By actuating both paddles simultaneously, the memories will alternately program in dits and dahs so that a string of dit-dahs results. If the dit paddle is depressed a bit before the dah paddle, the string will start with a dit; if the dah paddle is actuated first, the string will start with a dah. Such letters as A,C,K,N, and R can be formed with one squeeze motion of the fingers. Other letters such as F,L,Q and Y can utilize the insertion technique as outlined above for reduced hand motions and easier sending of more perfect code.

CIRCUIT DESCRIPTION

Referring to the block diagram and plug-in assembly schematic, Q1, Q2 and Q3 constitute a timing oscillator whose frequency is determined by C1 and the series combination of R1 and SPEED potentiometer, R23B. The oscillator is switched on and off from logic circuitry signals feed to the emitter of Q1 via gate 4-1. At the instant Q1 is turned on, C1 discharges immediately through transistors Q2 and Q3. The voltage at the collector of Q1 drops from a high to low state and linearily starts to charge back to the high state. The initial drop in this voltage is passed on to the base of Q4 through the weighting resistance network, R23A, R20, R22 and R19. Q4 turns off which in turn turns gate 4-4 on. The low state of this gate is passed on to the driver transistor, Q5 through D1, shorting the key line. This state remains until the ramp voltage on the base of Q4 reaches the turn-on level for this transistor, which then causes gate 4-4 to change state. In turn, the output of gate 4-3 goes low, providing flip-flop, IC-5, is not keeping the input voltage low through D2. This is the case if a dit was sent. If a dah was initiated, IC-5 would have been enabled through a logic signal applied to the set terminal, pin 8, and the key line would remain low due to pin 10 becoming low. The dah logic would also keep the oscillator running. A reset pulse is generated at the base of Q2 and applied through gate 4-2 to the logic so that the circuit reverts to the initial state after completion of the character. Basically, the timing oscillator applies the dit pulse to the key line driver and the dah is formed by having the oscillator send two dits to the driver transistor with the flip-flop IC filling in the space between the two dits.

The length of the dit, hence its weighted value, is determined by selecting the voltage along the ramp voltage at which Q4 starts to conduct. The potentiometers in the weighting network serve to select this variable, and through coupling of this network to the SPEED control, the variable weighting function is achieved. For fixed weighting, the WT switch shorts potentiometer, R23A.

Power of 5 VDC for the keyer is developed through zener diode D3 and series resistors R13 and R14.

INCREASING MAXIMUM SPEED

To increase the maximum speed of Model 645 to a value higher than 50 WPM, replace R1 on the PC assembly with a resistor of lesser value. A 2.7K resistor will increase the maximum to approximately 90 WPM. Values between 4.7K and 2.7K will affect the speed in between 50 and 90 WPM. The lowest speed of about 6 WPM will not be materially affected by this change. The increased speed range resulting from this modification may be somewhat more difficult to adjust accurately. To compensate for this, you may wish to increase the minimum speed as detailed below.

INCREASING MINIMUM SPEED

To increase the minimum speed at full CCW setting of the SPEED control, R23B may be shunted with an appropriate resistor from wiper terminal to ground. A 27K resistor shunting the control will increase the slowest speed from 6 to approximately 9 WPM. It is not recommended that too severe a change in minimum speed be attempted if the AUTO weighting feature is used. Shunting the speed potentiometer with a fixed resistor changes the taper of the control, and since the auto weighting circuit gangs two potentiometers together, the tracking of weight change from low to high speed will be affected. If fixed weighting is used, the minimum speed modification will not affect weighting, and any amount of change can be accommodated. R23B is the front section of the dual SPEED control.

PADDLE CARE

Even though the mechanical paddle suspension system of the 645 is rugged, reasonable care should be taken to preserve the delicate feel and fine performance capable from the unit. The ball bearings are hardened steel, but because of the very small displacements encountered, a sharp blow to the paddle may cause the balls to deform slightly, or cause the aluminum shaft to become loose from the bearing assembly. A good test of freeness in the system is to turn the TOUCH control fully CCW. Then by turning the keyer first vertically one way and then the other, the gravitational pull created by the paddles being eccentric to the shafts should be enough to key the keyer on in both positions -- dits in one and dahs in the other. (The approximate torque force on the shafts under this test is 4 grams at the center of the paddle finger area.)

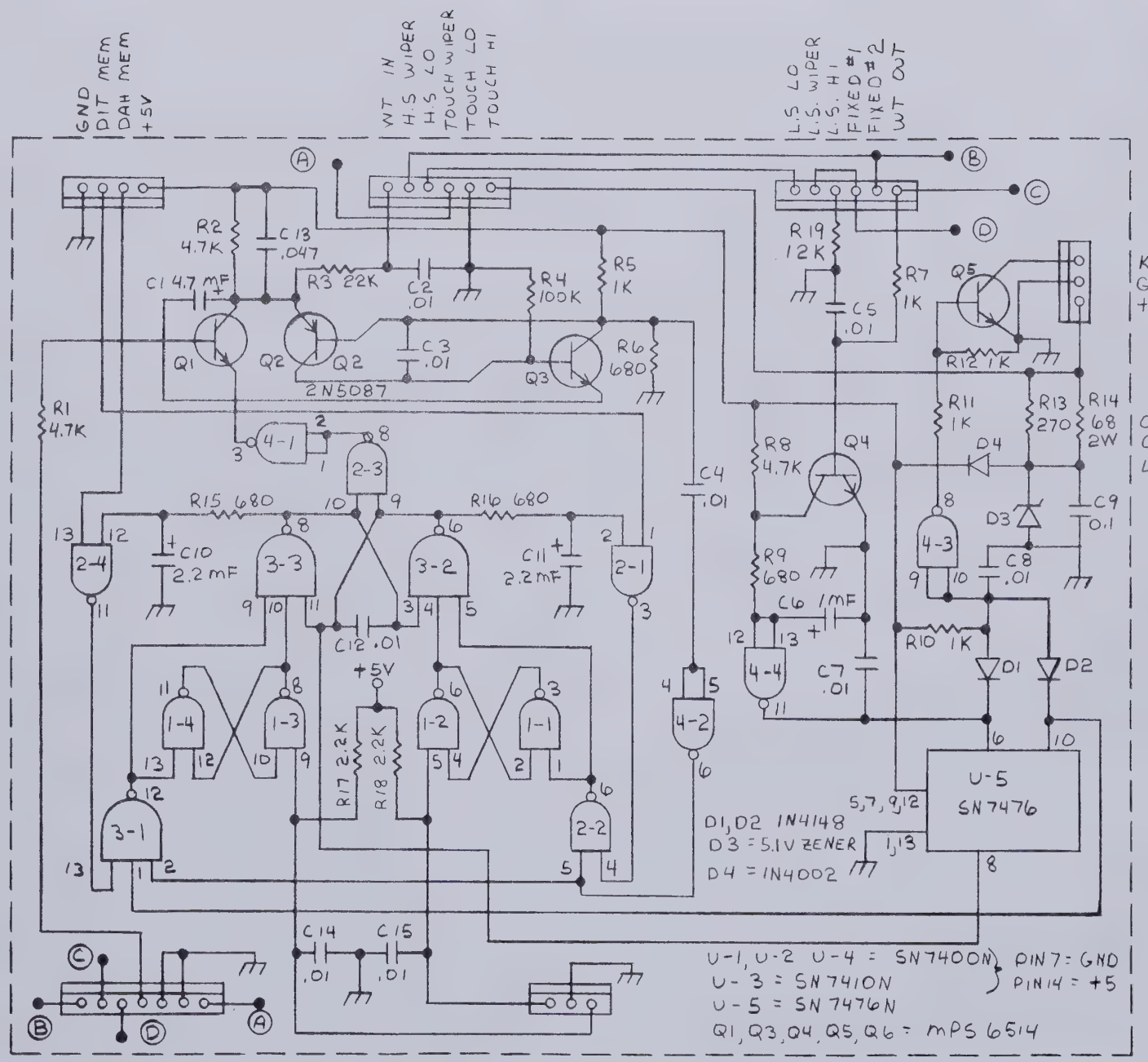
The ball bearings should not be lubricated at any time. Factory lubrication should last the lifetime of the keyer.

LEFT-HANDED CW OPERATORS

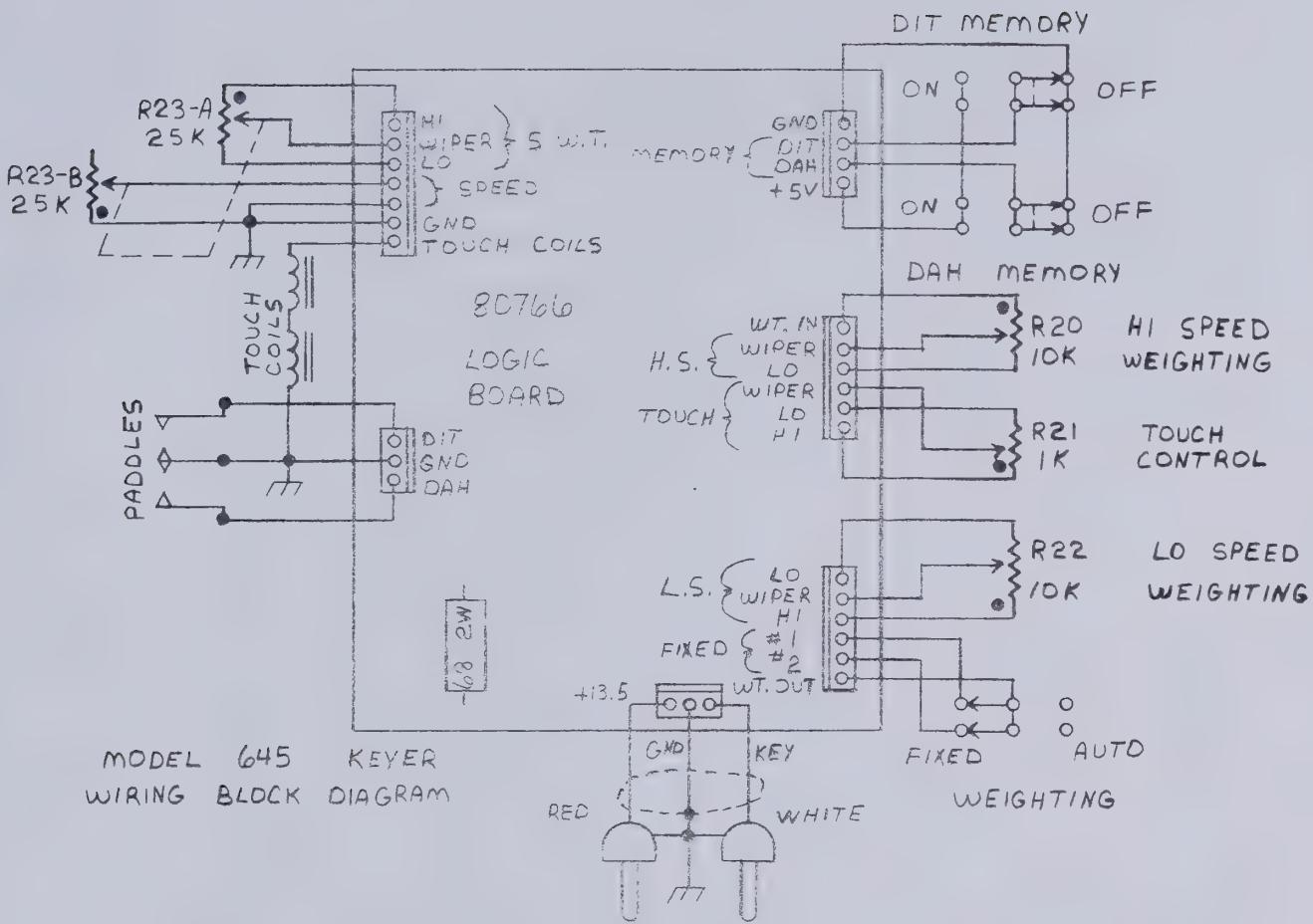
If you wish to switch the dit and dah paddles, remove the top of the unit and locate the brown and violet wires on the PC socket. Unsolder these two leads and interchange them. Resolder and reassemble the keyer.

PC BOARD ORIENTATION

The PC assembly constitutes most of the circuitry, with the exception of controls, switches, and paddle assembly. It contains all logic, timing oscillator and power supply components. Orientation is such that the one large resistor lies to the right front of the keyer when PC assembly board is properly mounted. All connections to the LOGIC BOARD are through plug-in mass termination connectors.



80766 LOGIC BOARD 10-80



MODEL 645 KEYER
WIRING BLOCK DIAGRAM

PT. NO. 74113
7/81

TEN-TEC INSTRUCTION SHEET
MODEL 223 NOISE BLANKER

GENERAL

Model 223 is an i-f type noise blanker constructed as a PC module. It is intended for use with the Argosy transceiver Model 525.

INSTALLATION

1.) Remove 4 screws holding the top. Carefully remove the top and set aside.

2.) Insert 3 retainers into the Model 223 circuit board from the top. Push 4 spacers over the retainers from the bottom. Insert 4 sheet metal screws through the retainers (refer to Fig.1).

3.) The Model 223 mounts in the left rear corner of the top deck. Place the Model 223 in this area and align the sheet metal screws with the holes in the chassis. The assembly number 80810 should be on the left side.

4.) Securely tighten all sheet metal screws.

5.) Plug cable 24 (blue) into socket 24, plug cable 30 (red) into socket 30.

6.) Locate socket 18-22 beside the crystal filter on the RF/MIXER board. Cut the purple jumper wire which crosses around this socket.

7.) Plug cable 18 into socket 18 on RF/Mixer, plug cable 18 into socket 18 on noise blanker, plug cable 22 into socket 22, and plug cable 23 into socket 23.

8.) Apply power to Argosy. Repeak transformer T1 on the RF/Mixer for maximum signal.

9.) Replace the top and tighten the 4 screws.

IMPORTANT: When the transceiver is used in a mobile installation and the antenna is bumper mounted, it is mandatory that the bumper be bonded to the car body. New cars use a shock absorbing bumper system and the bumper is not electrically connected to the car body. Failure to bond the bumper to the car body can result in erratic SWR and the lack of effective noise blanking.

OPERATION

The blanker is energized by the front panel switch. It will be found that performance will be most effective when noise pulses are short in duration and comparatively long in period. Characteristic types are from automotive ignitions, sewing machines, small dc motors etc. Noise with short periods and longer duration such as QRN, are less discernible by the circuits and consequently more difficult to eliminate.

THEORY

The noise blanker is inserted in the i-f path between the first mixer and the crystal filter. Transistors Q1 and Q2 comprise a wide band buffer amplifier driving the noise gate T1-T2, D1-D2. The noise pulses are amplified by U1 and detected by Q4. Q3 drives the noise gate. Q4 and Q5 provide an AGC voltage which is applied back to U1.

Only one component is adjustable. Trimmer capacitor C1 is adjusted for maximum signal at the base of Q4 with a 100 mV signal applied at the antenna. This tuned circuit is quite broad due to the low Q, and adjustment of C18 is not critical, typically at half mesh.

80810 NOISE BLANKER

PARTS LIST

C2,4,8,9,11,16	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
C3,7,12,13	23014	CAP-FXD, 22 PF, 50 V, 5%
C1	23061	CAP-VAR, 5/60 PF, TRIMMER
C10,15	23132	CAP-FXD, .01 MF, 100 V, CER
C14	23135	CAP-FXD, 560 PF, 100 V, 5%
C6,17	23139	CAP-FXD, 100 PF, 100 V, 5%
C18	23140	CAP-FXD, 82 PF, 100 V, 5%
C5	23181	CAP-FXD, 1 MF, 50 V, EL, VERT
Q5	25001	TRANSISTOR - 2N5087
Q1-4,6	25054	TRANSISTOR - MPS6514
U1	25062	IC-MC1350P
D1,2	28017	DIODE - PIN, MPN3404
T1,2	85036	TOROID - RF, 16 T, #28
L1	85134	RF TRANSFORMER - TRIFILAR

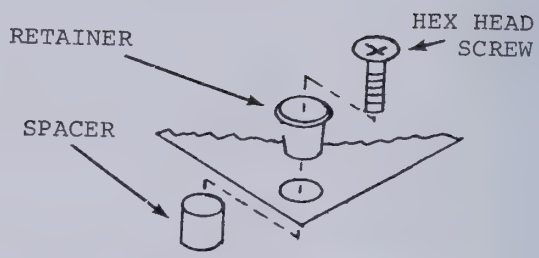
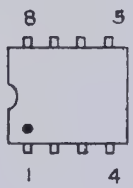
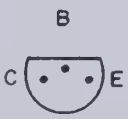


Fig. 1

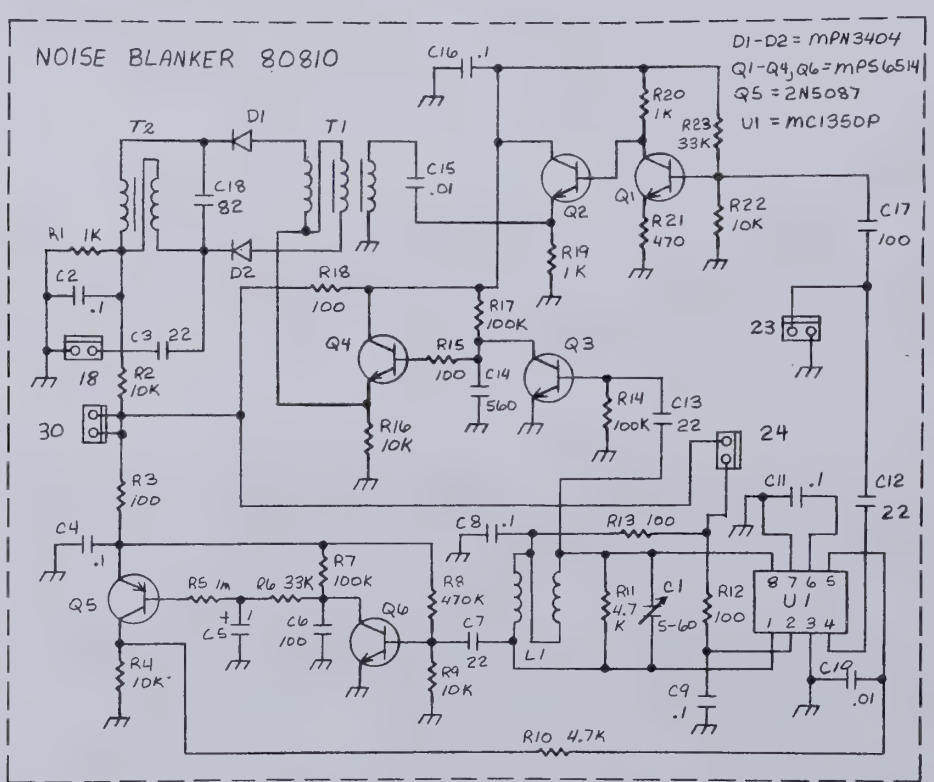
U1

PIN	VOLTAGE
1	13.27
2	12.62
3	0
4	4.22
5	5.70
6	4.20
7	0
8	13.28





TRANSISTOR	COLLECTOR	BASE	EMITTER
Q1	7.90	2.55	1.85
Q2	11.90	7.90	7.20
Q3	8.90	0	0
Q4	11.90	8.90	8.26
Q5	3.87	13.16	13.80
Q6	13.67	.28	0



TEN-TEC ENGINEER DATA

MODEL 215P MICROPHONE

Model 215P is a ceramic omnidirectional microphone designed for communications applications of all types. Frequency response is tailored to provide a high degree of articulation and the unit is provided with a switch to control associated equipment.

Size, balance and geometry of the microphone allow hand held operation for long periods of time with minimum fatigue, and separate diecast base converts it to a desk mike.

SPECIFICATIONS

Element: Piezoelectric Ceramic.

Frequency Response: 100-6,000 Hz.

Impedance: High. Recommended input impedance, 500 k ohms minimum.

Output Level: -56 dB re 1 V/dyne/cm^2.

Polar Response: Essentially omnidirectional, becoming slightly directional at high frequencies.

On-Off Switch: Leaf type, SPDT. When actuated, short to ground is removed from microphone circuit and grounds relay circuit.

Connector: Barrell= Common ground: Band= Microphone: Tip= Switch.

Cable: Five feet, three conductor, one shielded.

Construction: Front section pressure diecast. Rear case molded from cycolac.

Finish: Grey front, black rear.

Dimensions: Width= 1-7/16" Depth= 1-11/32" Length= 7-11/16".

Weight: Microphone - 8 ounces. Desk Base - 13 ounces.

Warranty: Guaranteed for one year from date of purchase against defects in materials or workmanship.

INSTALLATION CAUTION NOTICE

Standard practice on this and all quality microphones is to ground the microphone element and case to afford best shielding and lowest hum pickup. On some equipment an AC-DC circuit is used. This allows the ground circuit within the equipment to be connected to one side of the AC line, and thus presents a possible shock hazard. It is recommended that this microphone not be used with this type of equipment.

Pt. No. 74060

MODEL 670 CENTURY KEYER

TEN-TEC Model 670 Keyer was designed specifically for use with the TEN-TEC Century/21 transceiver. Low voltage positive transistor switching is incorporated to interface with the transceiver keying circuit, resulting in a reliable and economical means of keying the transmitter. Model 670 features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, speed control with a range between 6 and 50 words per minute and matching enclosure. Power for the keyer is drawn from the Century/21 supply, and so no separate on-off switch is needed.

SPECIFICATIONS

Keyer Output Circuit: Positive low voltage transistor switch.

Speed Range: 6 to 50 WPM.

Time Base: Keyer starts with paddle actuation.

Character Generation: Self-completing dits and dahs.

Weighting: Dit length increased approximately 10% at 20 WPM.

Power Required: 10-14 VDC taken from Century/21 supply.

Paddle: Single type. Molded plastic, with adjustable contact spacing.

Semiconductors: 1 Integrated Circuit; 5 Transistors; 9 Diodes.

Size: HWD 2" x 4" x 6"

Weight: 1 lb, 8 oz.

INSTALLATION

The cable attached to Model 670 contains two phono plugs. Connect plug with red marker into one of the two AUXILIARY 12 VDC jacks on rear panel of the Century/21, and the remaining plug into the KEY jack.

OPERATION

Actuating paddle from right to left with the forefinger will produce a string of dahs as long as the paddle is depressed. Actuation in the opposite directing with the thumb produces a string of dits. Thumb screws on either side of the paddle are used to adjust contact spacings, and hence the amount of paddle travel, to your preference. This spacing should not be too great, especially when sending at the higher speeds, so that effortless and correct spacing between characters and letters is maintained.

CAUTION: This keyer will not key transmitters with cathode or grid-block keying. Application of high positive or negative voltages such as those encountered in these keying circuits will damage the switching transistor in the keyer. OUR WARRANTY DOES NOT COVER DAMAGE INCURRED WHILE ATTEMPTING TO KEY TRANSMITTERS OTHER THAN THE TEN-TEC CENTURY/21.

CIRCUIT DESCRIPTION

Q1, Q2 and Q3 constitute a relaxiation oscillator whose frequency is determined by the RC combination of C1, R1 and R2. The oscillator is keyed to the oscillating state when either the dit or dah paddle contact is grounded. This connects the base of Q2 to ground through either D7 or D9. These diodes isolate the paddle contacts from the self-completing circuits once contact is made.

Output from the relaxation oscillator is applied to the dual flip-flop, IC-1. If a dit is sent, the first section of the flip-flop changes state and, in so doing, holds the relaxation oscillator on by applying a low voltage from pin 11, through D4, to the base of Q2. With the application of the second pulse from the oscillator to the flip-flop, the state of pin 11 is again changed, and the high voltage from this pin is blocked by D4. This allows the oscillator to stop operation. The square wave produced at pin 10 of the flip-flop is applied to the base of keying transistor Q4, which in turn keys a dit to the transmitter.

The same procedure is followed for the dah, except that when this contact is closed, the second flip-flop in IC-1 is "set" or enabled by applying a positive voltage to the "SET" terminal, pin 3, through inverting transistor Q5. In this case, D4 and D8 alternately keep the oscillator running until the second flip-flop completes its cycle. D5 and D6 alternately turn on the keying transistor Q4 to produce the dah. The duration of the square wave from the second flip-flop is twice the length of the dit, so that when the two flip-flop outputs are serially added and applied to Q4, the total length of time for the dah is the required three dit lengths.

C4 in conjunction with R8 provides a time constant that slightly lengthens the pulse applied to the base of Q4and thus provides a small amount of weighting to the character length.

Approximately 13 VDC from the Century/21 supply is applied to zener diode D2, through dropping resistors R11 and R12, and is regulated by the diode to approximately 5.6 volts. This voltage is applied to all keyer circuits and is filtered by C7.

INCREASING MAXIMUM SPEED

To increase the maxim speed limit from the factory setting of 50 WPM, replace R2 on the PC assembly with a resistor of lesser value. A 1.8K resistor will increase the maximum speed attainable to approximately 90 WPM. Values between 3.3K and 1.8K will provide maximum speeds between 50 and 90 WPM. The lowest speed of 6 WPM will only slightly be increased by changing R2. The increased speed range resulting from this modification may somewhat reduce the ease of setting the control to the desired speed. To compensate for this, you may want to increase the minimum speed as detailed in the next paragraph.

INCREASING MINIMUM SPEED

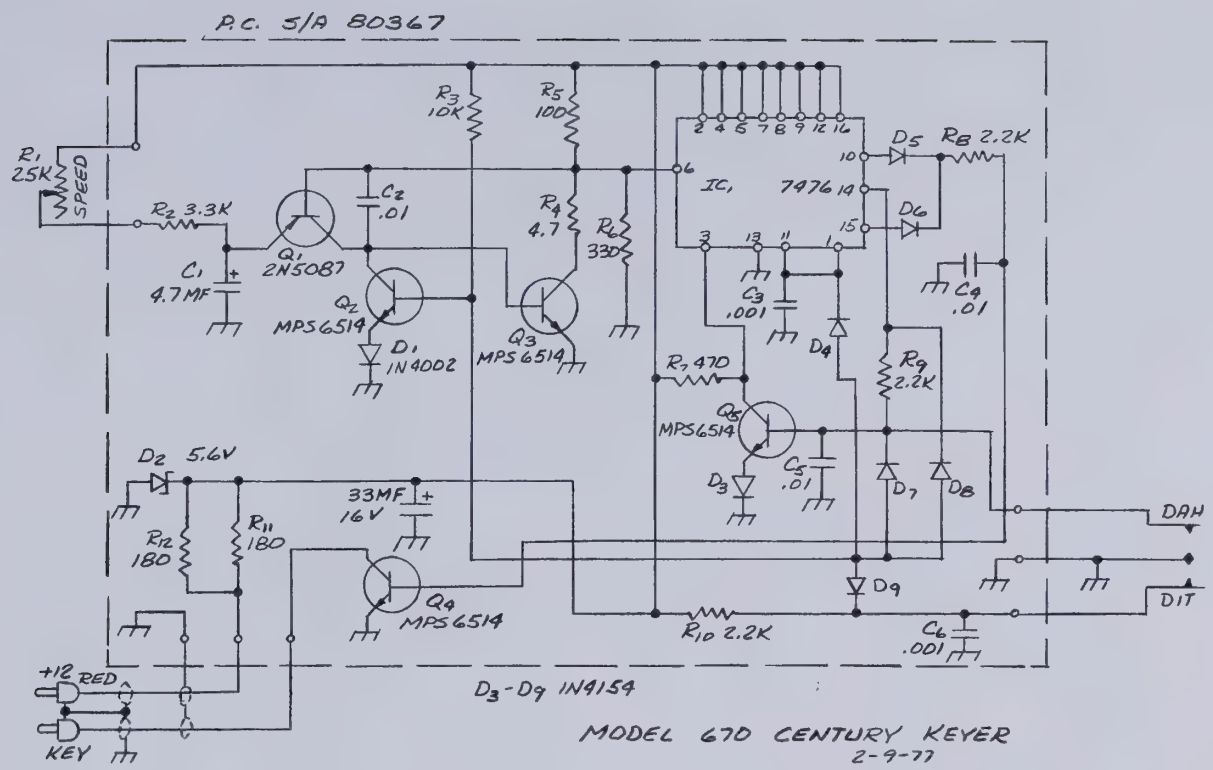
The minimum speed attainable can be increased from 6 WPM by bridging a resistor across the two active terminals of the SPEED control R1, or by replacing the control with one of smaller total resistance. For example, a 27K resistor shunted across the control, or a replacement control of 15K, will increase the minimum speed to approximately 9 WPM. Lower resistance will further increase minimum speed. This modification has no affect on the maximum speed limit since the control is completely out of the circuit when fully clockwise.

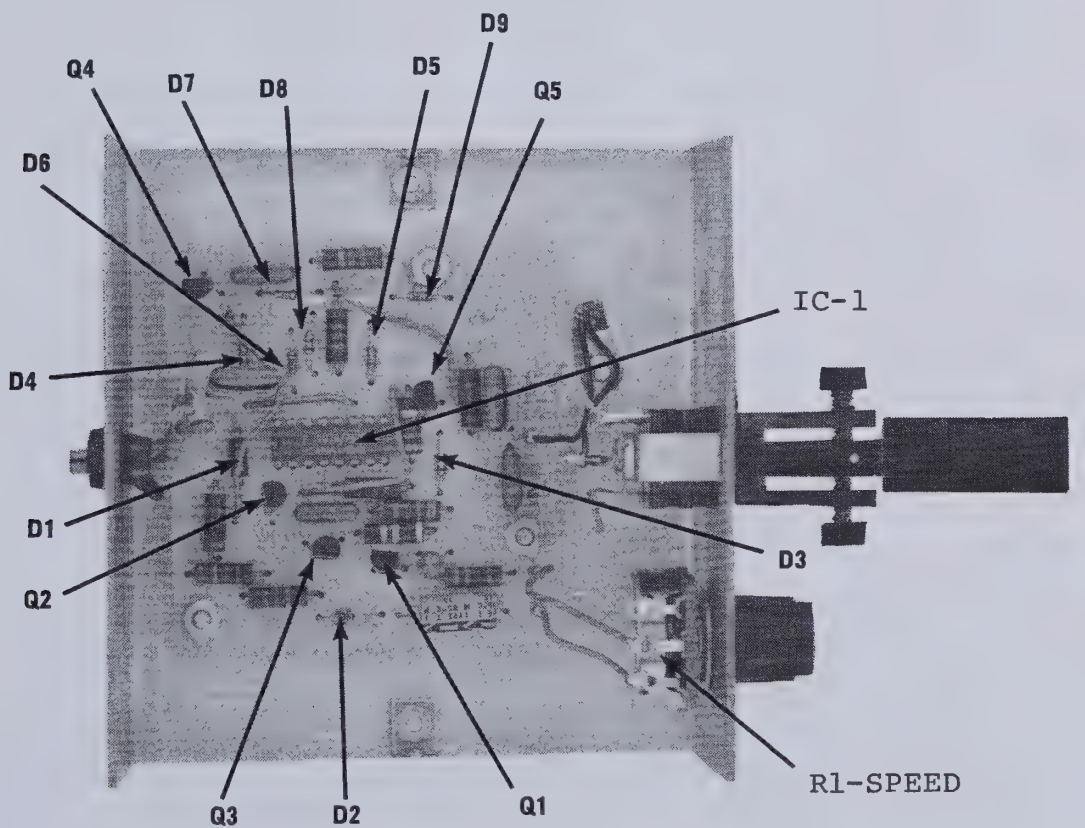
REMOVING WEIGHTING CIRCUIT

To remove all weighting so that dit and space durations are equal, replaced C4 with a .001 mfd capacitor. It is not recommended that weighting be increased above the factory set level because articulation (readability) of the code will deteriorate, especially at the higher speeds.

LEFT-HANDED CW OPERATORS

If you wish to switch the dit and dah paddles, simply exchange the two wires going between the paddle assembly and the PC board to the opposite board terminals.





MODEL 670 CENTURY KEYER

TEN-TEC INSTRUCTION SHEET
MODEL 705 STATION MICROPHONE

The TEN-TEC Model 705 desk microphone is especially designed for amateur communications and is compatible with the following TEN-TEC transceivers:

Model 535 Argonaut II	Model 562 OMNI V
Model 536 Delta II	Model 563 OMNI VI
Model 555 Scout	Model 564 OMNI VI *Plus*
Model 556 Argo	Model 585 Paragon
Model 560 and 561 Corsair*	Model 586 Paragon II

* *with small resistor modification, see below.*

The microphone consists of a base section that incorporates the Push-to-Talk (PTT) switching circuitry, an audio amplifier stage and a battery compartment for an optional 9 volt alkaline battery. The electret microphone element itself is mounted at the end of a flexible gooseneck and is protected by a foam filter.

Installation and Use

The shielded cable and connector interface directly to any of the transceivers listed above. Four connections are completed between the microphone and transceiver. They are:

Pin 1 - Audio Signal
Pin 2 - Shield and Audio Ground
Pin 3 - Push-to-Talk Line
Pin 4 - DC Power Line

Two pushbuttons are provided for keying the transceiver in PTT mode. The gray button is momentary, it will key the transceiver as long as it is held down. The black button is locking. It works along with switching circuitry in the microphone base to implement a push-on, push-off type action.

To operate in VOX mode, the microphone must be locked in the on condition using the black pushbutton. This will power up the microphone element and the amplifier so that audio signals are available to the input of the transceiver at all times.

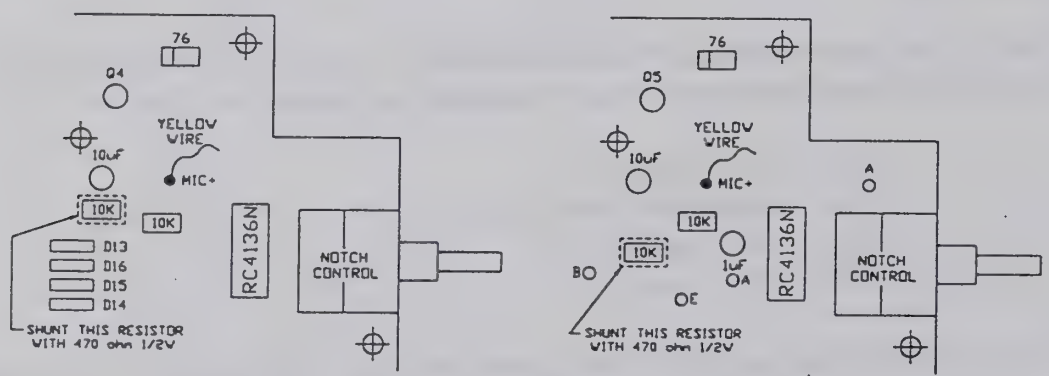
Note: A slide switch is provided on the bottom of the microphone for disabling the PTT connection to the transceiver during VOX operation. This feature may be needed if the microphone is used with non TEN-TEC equipment. By setting the slide switch in the VOX position, it allows the microphone to be keyed up for VOX operation without activating the PTT line. **When using the microphone with TEN-TEC transceivers, however, this switch must be in the PTT position.**

When used with TEN-TEC transceivers, the microphone is powered entirely from the DC voltage available at the microphone jack. When used with other equipment, you may need to install an internal 9 volt battery to power the circuitry. The battery compartment is located on the base of the unit. Remove the two small screws and install the battery into the spring clip on the inside of the cover. Attach the battery snap and test the unit by pressing either PTT button. The LED should now activate.

ATTENTION CORSAIR OWNERS

All Corsair and those Corsair II transceivers with serial numbers below 580-1970 will require a small modification before the Model 705 will operate without the need for the internal battery. A 10K ohm resistor close to the terminal pin with the yellow wire on the IF/AF assembly (see sketch) must be bridged with a 470 ohm, 1/4 watt resistor. Unfortunately, this resistor does not appear on the IF/AF schematic diagram in the Corsair manual. Electrically it is between the positive regulated supply of the transceiver and pin 4 on the microphone connector.

EARLY CORSAIR MODS FOR MODEL 705 MICROPHONE:



IF - AF BOARD 80984

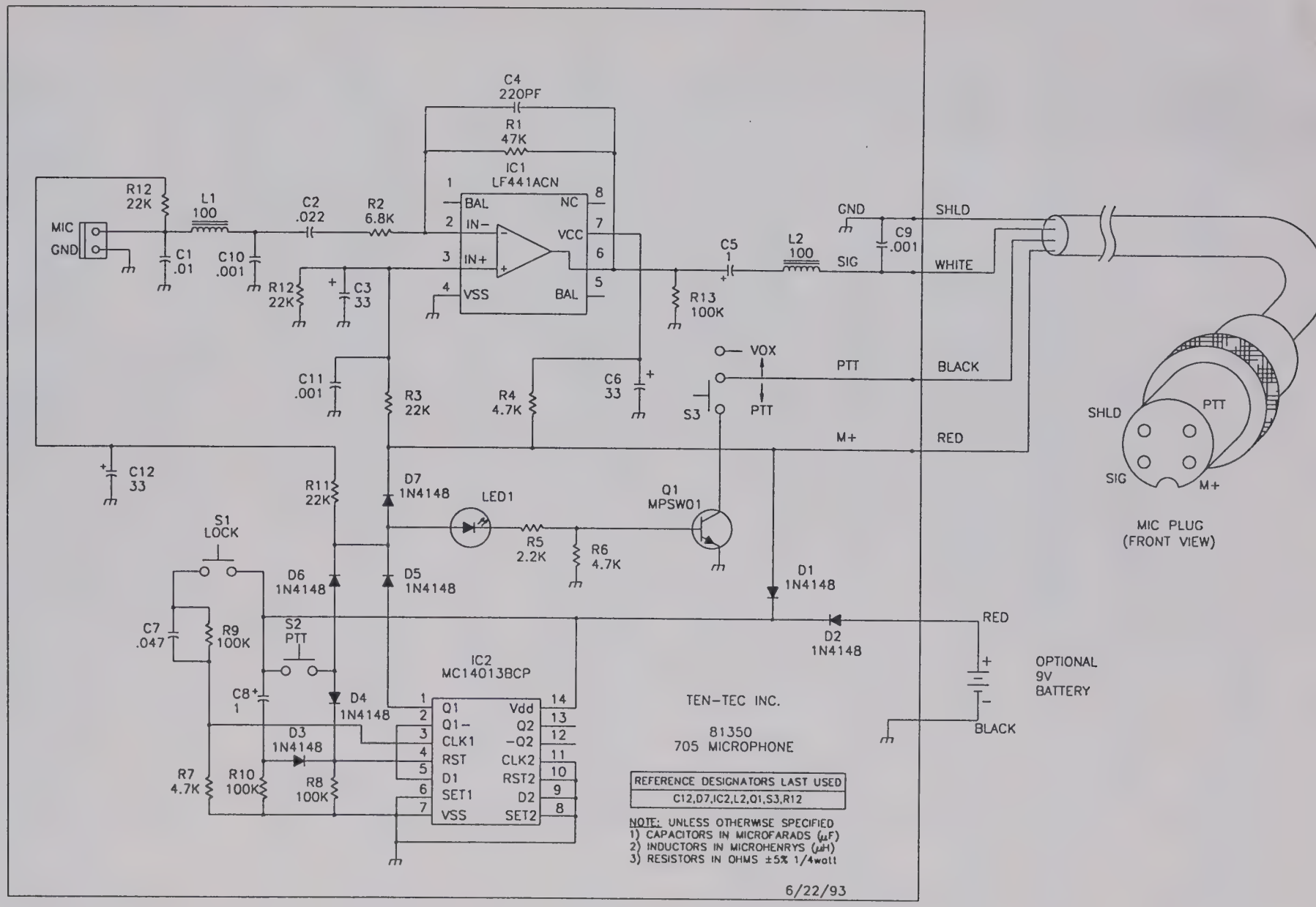
Specifications

TYPE: Electret condenser element
SENSITIVITY: -52 dBv (0 dBv = 1V/ubar at 1 kHz)
OUTPUT IMPEDANCE: Drives any input of 100 ohms or more.
MAXIMUM SOUND PRESSURE LEVEL: 130 dB
BATTERY TYPE: 9 volt alkaline transistor battery
POWER: Receive mode, 2 uA; Transmit mode, 2 mA
WEIGHT: 12 oz. including battery.

TEN-TEC Inc.
Part No. 74179

Printed in U.S.A.
March 1997

TEN-TEC Inc.
Part No. 74179



SCHEMATIC DIAGRAM MODEL 705

Printed in U.S.A.
March 1997

TEN-TEC, Inc.
1185 Dolly Parton Parkway
Sevierville, TN 37862

CUSTOMER SERVICE TELEPHONE
423-428-0364

LIMITED WARRANTY AND SERVICE POLICY, U.S.A.

TEN-TEC, Inc. warrants this product to be free from defects in material and workmanship for a period of one year from the date of purchase, under these conditions:

1. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL OWNER. It is important that the warranty registration card be sent to us promptly to establish you as the owner of record. This will also insure that any bulletins pertaining to this equipment will be sent to you.

2. READ THE MANUAL THOROUGHLY. This warranty does not cover damage resulting from improper operation. Developing a thorough understanding of this equipment is your responsibility.

3. IF TROUBLE DEVELOPS we recommend that you contact our customer service group direct. The selling dealer is not obligated by us to perform service in or out of warranty. It has been our experience that factory direct service is expeditious and usually results in less down-time on the equipment. Some dealers do offer warranty service and of course, have our complete support.

4. WE ENCOURAGE SELF HELP. Taking the covers off does not void the warranty. In many cases our customer service technicians, with your help, can identify a faulty circuit board. In these cases we will send you a replacement board which you can change out. This will be shipped on a 30 day memo billing and when the defective board is returned, we will issue credit.

5. EQUIPMENT RETURNED TO THE FACTORY must be properly packaged, preferably in the original shipping carton. You pay the freight to us and we prepay surface freight back to you.

6. EXCLUSIONS. This warranty does not cover damage resulting from misuse, lightning, excess voltages, polarity errors or damage resulting from modifications not recommended or approved by Ten-Tec. In the event of transportation damage a claim must be filed with the carrier. Under no circumstances is Ten-Tec liable for consequential damages to persons or property caused by the use of this equipment.

7. TEN-TEC RESERVES the right to make design changes without any obligation to modify equipment previously manufactured.

8. THIS WARRANTY is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF THE U.S.A.

Many of our dealers provide warranty service on the equipment they sell. Many of them also provide out of warranty service on all equipment whether they sold it or not. If your dealer does not provide service or is not conveniently located, follow the procedure outlined above. Equipment returned to us will be given the same attention as domestic customers but all freight expense, customs and broker fees will be paid by you.

Part No. 74244

INSTRUCTIONS
MODEL 700/A/C MICROPHONE

GENERAL

Model 700 Microphone is a handheld electret condenser microphone designed for use in the commercial and Amateur Radio fields. It is housed in a rugged ABS plastic case and uses a high quality electret cartridge with a built-in integrated circuit preamplifier. Power is supplied directly from the transceiver via the mic cable or optional 9 volt battery.

The microphone comes with a Push-To-Talk (PTT) switch and can be used with Voice Activated (VOX) systems (except 700A, see paragraph about battery use).

The Model 700 comes without a connector, Model 700A comes with a 1/4", 3 conductor stereo plug for older Ten-Tec radios and Model 700C comes with a 4-pin connector wired for current Ten-Tec transceivers.

SPECIFICATIONS

TYPE: Electric Condenser Microphone
SENSITIVITY: -65 dBV (0 dBV=1V/uBar @ 1 KHz)
OUTPUT IMPEDANCE: 400 ohms, typical @ 1 KHz
POLARIZING POWER: 4 to 10 volts @ 300 uA typical
OPERATING TEMPERATURE: -10^{o} to $+60^{o}$ C.
MAXIMUM SOUND PRESSURE LEVEL: 130dB
PTT SWITCH: Shorts Pin 3 (yellow) to GROUND (black & shield)
SIZE: (HWD) 3-1/2" x 2-7/16" x 1-5/8" (89mm x 62mm x 41mm).
WEIGHT: 6 ounces (170 grams)

CABLE CONNECTIONS

Function	Model 700	700C	700A
Signal Lead	White (shielded)	1	RING
Common GND	Black & Shield	2	BARREL
PTT Switch	Yellow	3	TIP
+ Voltage	Red	4	-
Not Used	Blue	-	-

INSTALLATION OF HANGER

There are two methods of attaching the microphone to a supporting surface when not in use.

1) An adhesive Velcro patch is supplied if a suitable, clean mounting surface is available. Alcohol pads are supplied to clean the surface before applying the Velcro patch.

2) A plastic hook and hanger are supplied if the Velcro patch is not suitable. Attach the hook at the desired mounting location, using either #6 machine or wood screws. Remove the center screw from the back of the microphone and with the 1-1/8" (29mm) screw provided, attach the plastic eye at the location. The microphone can then be hung on the hook when not in use.

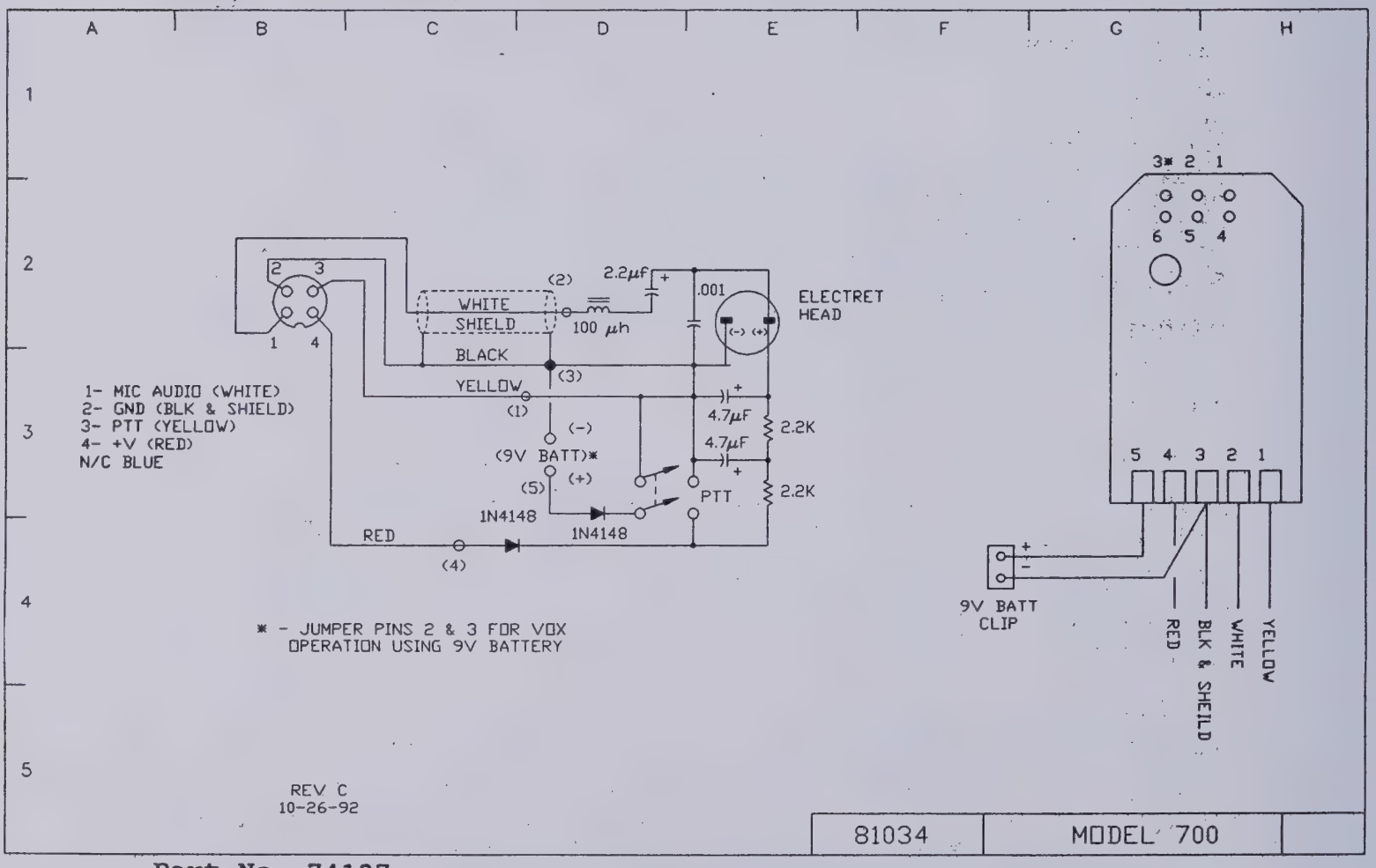
MODEL 700A BATTERY USE NOTE

The Model 700A requires the installation of a 9 volt battery to provide the proper polarizing voltage for the electret element. A battery and battery clip are provided. The other Model 700 mics can be modified for battery use (refer to the diagram below), but do not include the battery or battery clip.

VOX operation is not normally provided when using the 9 volt battery because of the constant current drain present. If VOX operation is desired, then pins 2 & 3 on the PTT switch will have to be shorted. See the diagram below.

NOTE: By shorting these pins, the battery will run down much faster than normal.

MODEL 700C SCHEMATIC DIAGRAM



Part No. 74127

TEN-TEC, INC.
1185 Dolly Parton Pkwy.
Sevierville, TN 37862
U.S.A.

Main Office..... 615-453-7172
Repair..... 615-428-0364
FAX..... 615-428-4483

10/26/92

INSTRUCTIONS
MODEL 705/705-A ELECTRET MICROPHONE

GENERAL

The TEN-TEC Model 705 is an Electret desk microphone designed for use as a station microphone in Commercial and Amateur Radio communications and in public address and paging installations. The microphone consists of a base section and flexible gooseneck mounted microphone. The Model 705 incorporates a momentary type Push-To-Talk (PTT) button (gray), a Push-On, Push-Off locking type button (black), electronic circuitry to switch the microphone on, a signal amplifier that adds 13 dB of gain to the output level, an attached output cable and a battery compartment for a 9 volt alkaline battery. The PTT circuitry allows switching transmitters and/or transceivers, that have low voltage positive T/R lines, into the transmit mode. A light emitting diode in the base signals the transmit mode.

The Model 705 comes in two versions. The standard unit includes a four pin standard locking type cable connector which is pin compatible with TEN-TEC Models 560 and 561 Corsairs, Model 562 Omni V, and the Model 585 Paragon. With a minor resistor change in the Corsairs (described below), the standard unit may be powered from the transceiver without the need for a 9 volt battery. The Model 705-A comes with a stereo type 1/4" phone plug. This unit is compatible with TEN-TEC Model 525 Argosy, Models 540 and 544 Tritons, Model 515 Argonaut and other early models. A 9 volt battery is required for the Model 705-A.

SPECIFICATIONS

TYPE: Electret Condenser Microphone.
SENSITIVITY: -52 dBV (0 dBV=1V/μBar @ 1 kHz).
OUTPUT IMPEDANCE: Works into any circuit of 100 ohms or more.
MAXIMUM SOUND PRESSURE LEVEL: 130 dB.
BATTERY TYPE: 9 volt Alkaline transistor battery.
ELECTRONICS: C-Mos PTT switch, C-Mos signal amplifier, NPN T/R transistor.
CURRENT REQUIRED: Receive mode: Less than 2 microamperes.
Transmit mode: 2 milliamperes typical, with 9 volt battery.
SEMICONDUCTORS: 2 ICs; 1 Transistor; 7 Diodes.
WEIGHT: 12 oz. including battery.

INSTALLATION

The standard Model 705 may be externally powered if desired. A source of 7 to 14 volts DC capable of delivering at least 5 milliamperes is required. If no external power source is contemplated, or when Model 705-A is used, a 9 volt alkaline type battery (not supplied) must be installed. The compartment, located in the base, is accessed by removing the two small screws holding the battery cover. A spring clip holds the battery and a standard connector is accessible through the opening. Proper battery installation can be checked by pushing the PTT button and observing the LED indicator. The gray button is a momentary Push-To-Talk type and the black button is a Push On-Push Off type.

The four pin connector wiring is:

Pin 1	—	White - Signal
Pin 2	—	Shield - Ground
Pin 3	—	Black - PTT Line
Pin 4	—	Plus Electret Voltage (7 to 14 VDC)

The stereo 1/4" phone connections are:

Tip	—	Black - PTT Line
Band	—	White - Signal
Sleeve	—	Shield - Ground

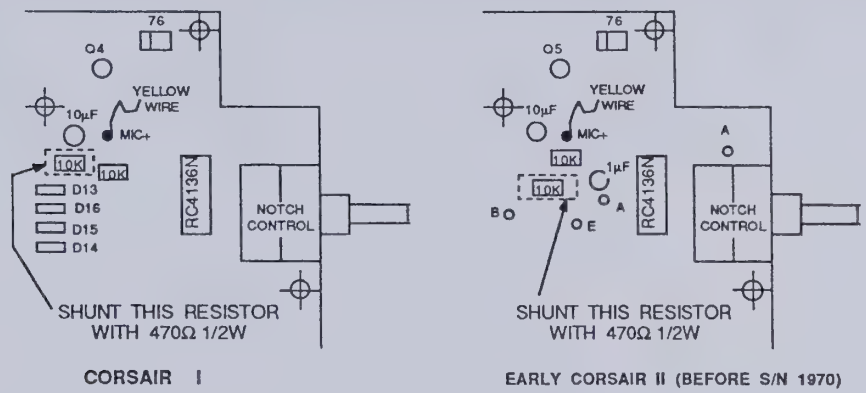
The internal NPN power transistor in the PTT circuitry has an open collector connection to the PTT lead in the output cable. Whenever the PTT button places the microphone in "Talk" mode as indicated by the LED, the transistor is turned on and the PTT lead is effectively grounded. This function can be used to key transistor transceivers "on" automatically, or may be used to close a relay that switches other types of transmitters "on", such as grid block keyed units.

CORSAIR MODIFICATION

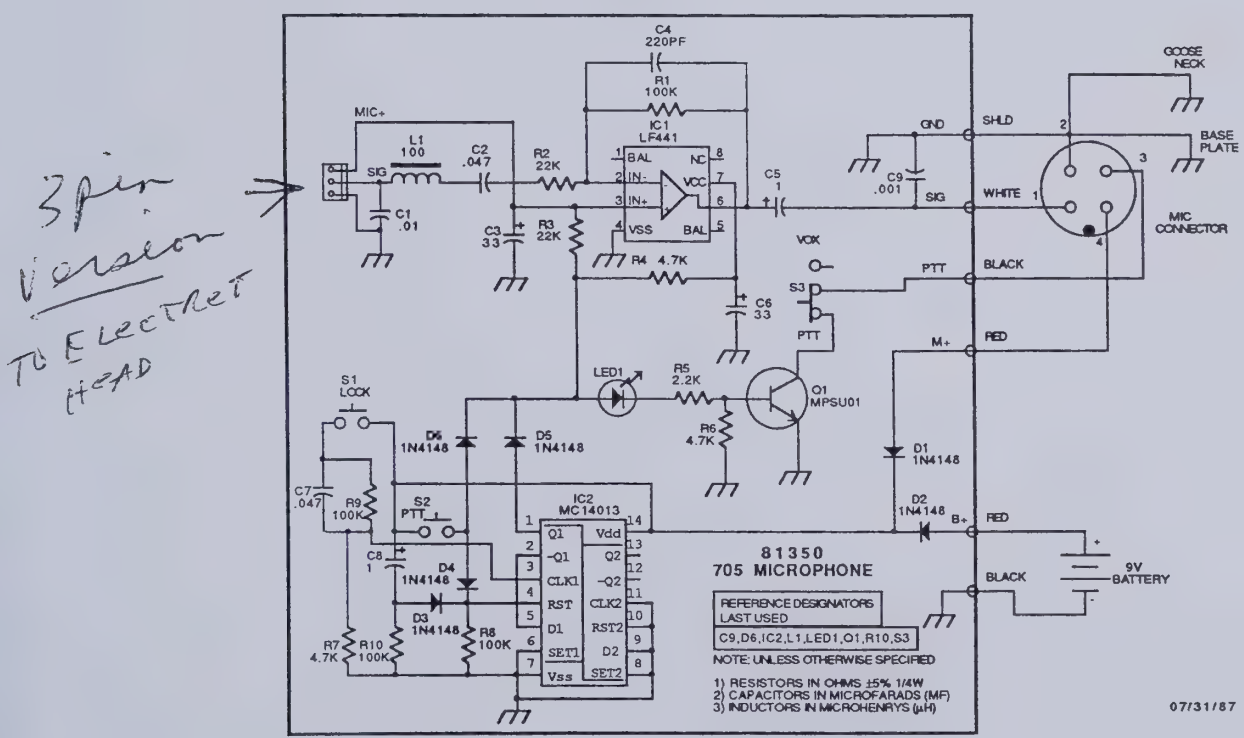
Standard Model 705 microphones may be powered from Corsair transceivers with a resistor change in the polarizing voltage circuit. All Corsair I and those Corsair II transceivers with serial numbers below 580-1970 will require this modification to eliminate use of a 9 volt battery. (These transceivers may be used without modification with the battery installed.) A 10 kohm resistor close to the terminal pin with the yellow wire, on the IF/AF assembly (see sketch), should be bridged with a 470 ohm, 1/2 watt resistor. Unfortunately, this resistor was left off of the IF/AF schematic, so it does not show up in the Corsair manual. However, it is electrically in series with the M+ (or +V) lead from Pin 4 of the Mic connector which appears in the chassis wiring diagram.

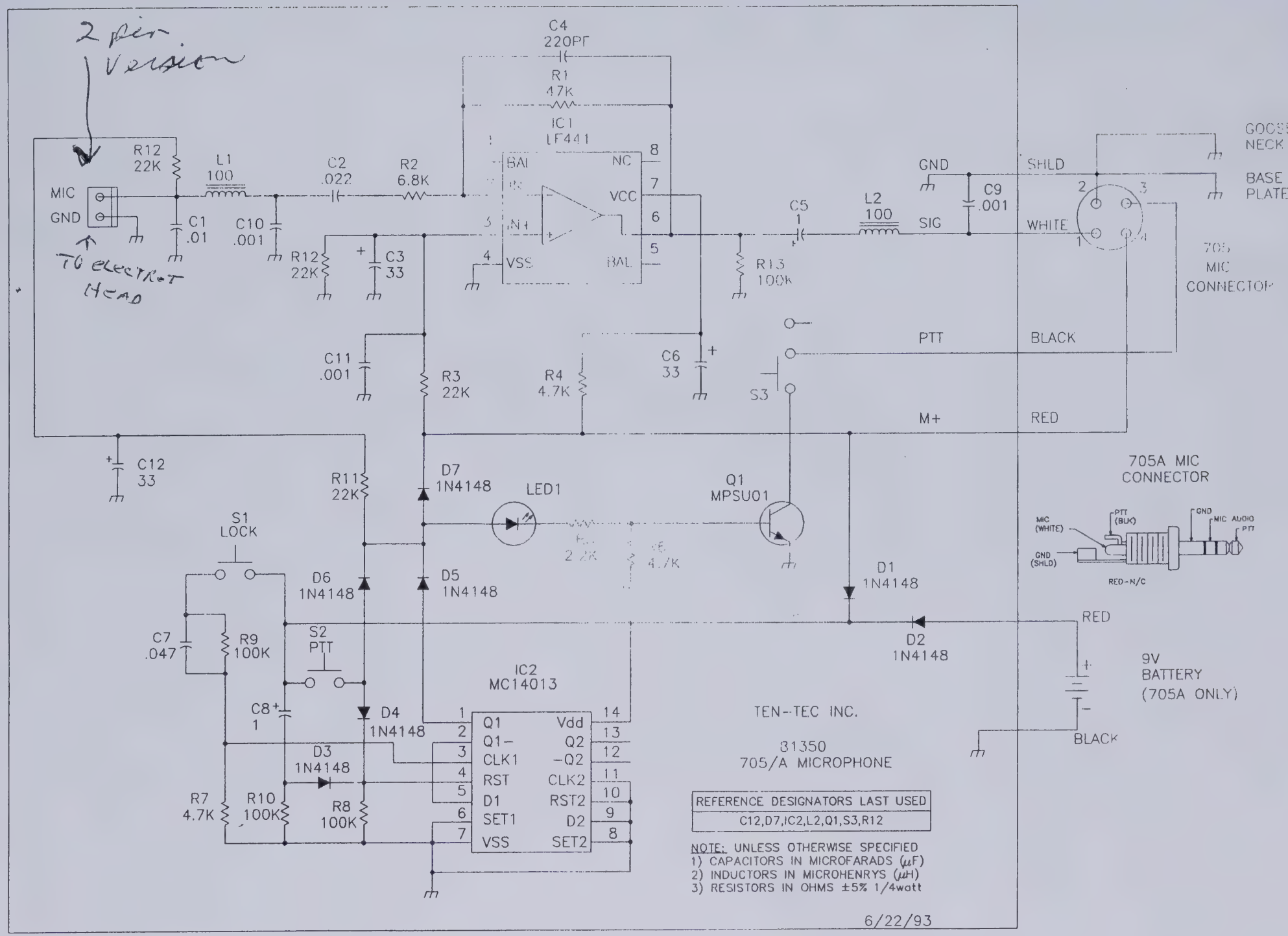
EARLY CORSAIR MODS FOR MODEL 705 MICROPHONE:

IF - AF BOARD 80984



SCHEMATIC DIAGRAM — MODEL 705




2 pin Version
C4 220PF
R1 47K
IC1 LF441
BAL
IN-
IN+
VSS
NC
VCC
BAL
8
7
6
5
4
3
2
1
R12 22K
L1 100
C2 .022
R2 6.8K
MIC
GND
C1 .01
C10 .001
TO ELECTRET HEAD
R12 22K
C3 33
R13 100K
C5 1
L2 100
GND
SHLD
C9 .001
SIG
WHITE
GOOSE NECK
BASE PLATE
705 MIC CONNECTOR
PTT
BLACK
M+
RED
C11 .001
R3 22K
R4 4.7K
C6 33
S3
C12 33
R11 22K
D7 1N4148
LED1
Q1 MPSU01
2.2K
4.7K
D1 1N4148
705A MIC CONNECTOR
MIC (WHITE)
GND (SHLD)
PTT (BLK)
GND
MIC AUDIO
PTT
RED-N/C
S1 LOCK
D6 1N4148
D5 1N4148
C7 .047
R9 100K
S2 PTT
D2 1N4148
RED
9V BATTERY (705A ONLY)
IC2 MC14013
C8 1
D4 1N4148
D3 1N4148
R7 4.7K
R10 100K
R8 100K
Q1
Q1-
CLK1
RST
D1
SET1
VSS
Vdd
Q2
-Q2
CLK2
RST2
D2
SET2
14
13
12
11
10
9
8
BLACK
TEN-TEC INC.
31350
705/A MICROPHONE
REFERENCE DESIGNATORS LAST USED
C12,D7,IC2,L2,Q1,S3,R12
NOTE: UNLESS OTHERWISE SPECIFIED
1) CAPACITORS IN MICROFARADS (μF)
2) INDUCTORS IN MICROHENRYS (μH)
3) RESISTORS IN OHMS ±5% 1/4watt
6/22/93

TEN-TEC INSTRUCTION SHEET
MODEL KR5-A

UNPACKING

Carefully remove your KR5-A from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary, they come in handy. Make sure that you have not overlooked anything.

GENERAL

The KR5-A is a solid state, integrated circuit electronic keyer incorporating a reed relay as the actual keying component. It can be used to key all grid-blocked keying systems as well as many cathode keyed transmitters, limited as outlined later by the 15 volt-ampere contact rating. For high current keying circuits, the KR5-A can key an intermediate power relay. Because of the extremely low contact resistance of the reed relay when closed, (not possible with solid state switches), this keyer is ideally suited to key very low impedance and/or low voltage keying lines, such as those encountered in transistorized equipment. The KR5-A features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, an over-ride button switch for transmitter tune-up, QRS sending or emphasis, DC operation from 6 to 14 volts and a plug-in PC board for easy servicing.

SPECIFICATIONS

Keyed Output: Reed Relay; 15 volt-amp contacts, 400 volts, max.
Speed Range: 6 to 50 WPM.
Time Base: Keyed to start with paddle actuation.
Character Generation: Self-completing dits and dahs.
Weighting: Dit length increased app. 10% @ 20 WPM. (Can be changed internally.)
Power: 6 to 14 VDC, 75-140 mA.
Paddle: Single molded plastic with adjustable contact spacing.
Semiconductors: 1 Integrated Circuit, 6 Transistors, 10 Diodes.
Size: HWD 2" X 4" X 6"
Weight: 1 lb, 8 oz.

CIRCUIT DESCRIPTION

Q1, Q2 and Q3 constitute a relaxation oscillator whose frequency is determined by the RC combination of C1, R1 and the setting of the SPEED potentiometer. The oscillator is keyed to the operating state when either the dit or dah contact is grounded, by placing the base of Q2 at ground potential. Diodes D6 and D7 are steering diodes to isolate the paddle contacts from the self-completing circuits once the paddle contact is made.

Output from the relaxation oscillator is applied to the dual flip-flop, IC-1. If a dit is sent, the first section of the flip-flop changes state upon closure of the paddle. The relaxation oscillator remains in the "on" condition because of the low potential applied to the base of Q2 through D2 from output pin 11, of the flip-flop. The high output on pin 10 is applied to the base of Q5, the relay driver, through D3, during this time. With the application of the next timing pulse from the oscillator to the input of the flip-flop, the state of the flip-flop is again changed, back to the original. This turns Q5 off, and opens the reed relay to complete the dit. During the sending of a dit, the second flip-flop is disabled by application of a low potential at pin 3 from conducting Q4. The same procedure is followed for the dah, except that when this contact is closed, the second flip-flop is "set" or enabled by applying a positive voltage to the

"set" terminal, 3 through inverting transistor Q4. Now D2 and D5 alternately keep the oscillator running until the second flip-flop completes its cycle, and D3 and D4 alternately turn on the relay driver transistor.

The outputs from the two flip-flops add to result in a dah. The over-ride switch shunts the collector of Q5 to ground and applies voltage to the reed relay coil. Q6 is a series regulator whose output voltage is determined by the zener diode, D10, in its base circuit. It regulates all input voltages between 6 and 14 volts down to approximately 5 volts, which powers all circuits.

OPERATION

Controls - Front Panel

POWER: Slide switch.
SPEED: Continuously variable between 6 and 50 WPM.
CONTACT SPACING: Thumb screws on paddle assembly. Dah on left side, dit on right side.
OVER-RIDE SWITCH: Touch button located on top lip of case. Momentary contact type.

Connections - Rear Apron

TRANS: This jack is keyed output presenting a short circuit to chassis whenever a character is being sent and an open circuit at all other times. Connect this jack to the transmitter KEY jack. It is advisable to use shielded cable to prevent rf pickup.

SERIES OHMS: Provides resistance in series with key line to prevent relay contacts from welding together. (Zero resistance in full CCW position.)

6-12 VDC: Power input jack. Connect source of DC voltage between 6 and 14 volts. Center pin is positive, chassis is ground.

Reed Relay Contact Protection

Most commercial vacuum tube transmitters and/or transceivers use a form of grid block keying. The voltage present at the key terminals varies from a few volts to several hundred volts. The current being keyed is usually small. The steady state voltage and current are easily handled by the reed contacts. In some transmitters, a capacitor is placed across the key line for by-pass purposes. The energy stored in this capacitor is released across the keyer relay contacts whenever the transmitter is keyed. Depending on the circuit constants, the surge current can exceed the ratings of the contacts, which may result in welded together contacts. Since this is a high impedance circuit, a small resistor can be connected in series with the keyer relay output to limit the transient current surge to a safe value without affecting the operation of the transmitter. The SERIES OHMS control on the rear panel provides this current limiting function. It is a 250 ohm rheostat. For grid block keying transmitters, normal range of this control is from one half to full CCW position. For solid state and low voltage key lines, full CCW to one half rotation is normal. (All TEN-TEC transceivers should use full CCW position.) If keying system of your transmitter is unknown, start with control fully clockwise and reduce resistance until reliable keying and full output are attained. If relay in keyer exhibits contact sticking, increase SERIES OHMS control setting clockwise until reliable keying is achieved.

When cathode keyed transmitters are used with the KR5-A, determine if the volt-ampere ratings are being exceeded by multiplying the key-up cathode voltage by the key-down cathode current. This product should be less than 15 to be within contact ratings. If it is higher, an intermediate power relay should be used, e.g. key-up cathode voltage = 50 volts and key-down cathode current = 200 mA. Product E x I = 50 x .2 = 10 volt-amps. Within ratings.

Over-ride Button Switch

To key the transmitter on continuously, or to send at a speed slower than that set by the SPEED control without changing it, lightly touch the orange disc button switch on the unit. This is a momentary type that requires very little force and displacement. A natural hand position for utilizing this feature is to use the thumb and middle finger for paddle actuation and the index finger for over-ride.

Increasing Maximum Speed

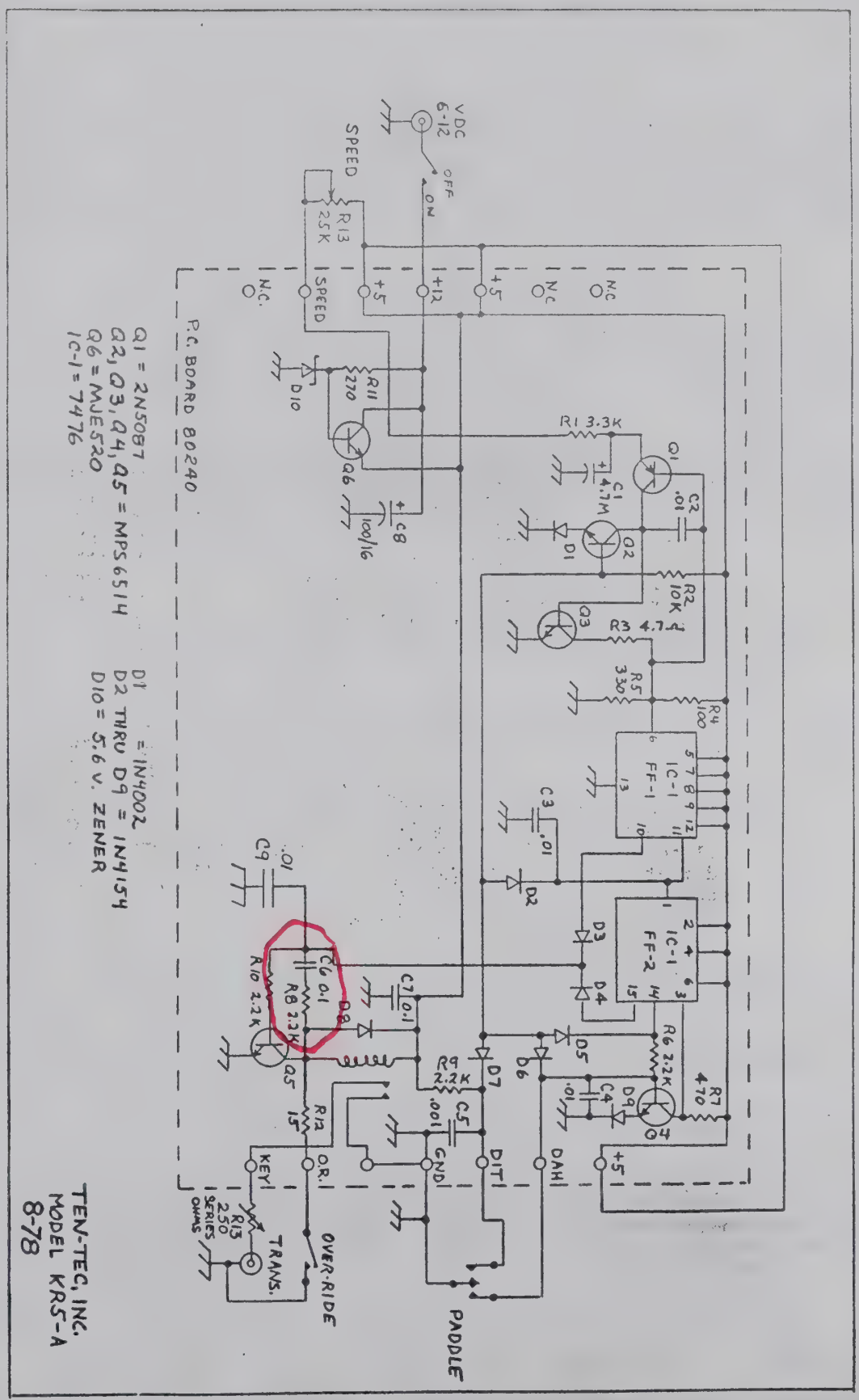
To increase the maximum speed of the KR5-A, replace R1 on the PC assembly with a resistor of lesser value. A 1.8 K resistor will increase maximum speed attainable to approximately 90 WPM. Values between 3.3 K and 1.8 K will adjust highest speed to a value between 50 and 90 WPM. The lowest speed of 6 WPM will not be materially affected by this change. The increased speed range resulting from this modification may be somewhat more difficult to adjust accurately. To compensate for this, you may choose to increase the minimum speed as detailed below.

Increasing Minimum Speed

The minimum speed of the KR5-A may be increased from the nominal 6 WPM as shipped by shunting a resistor across the two active terminals of the SPEED potentiometer, or by replacing the potentiometer with one of smaller resistance value. For example, a 27 K resistor shunted across the SPEED control terminals, or replacing the control with one whose resistance is 15 K, will result in a minimum speed of approximately 9 WPM. Lower resistance values will increase the minimum speed correspondingly. No change will be encountered in the maximum speed with this modification since the control resistance is turned to zero.

Changing Weighting

To remove all weighting so as to result in equal dit and space durations, remove either R8 or C6 from the PC assembly. To lengthen the dit length more than that provided, increase the value of C6. As shipped from the factory, the weighting lengthens the dit length from the classical equal dit and space times by about 10% at 20 WPM. The percentage increases with faster speeds and decreases with lower speeds. Changing C6 from 0.1 to 0.2 mfd will approximately double the percentage. It is recommended that heavy weighting be avoided since articulation will deteriorate somewhat at faster speeds. In no case should C6 be greater than 0.22 mfd.



Q1 = 2N5087
Q2, Q3, Q4, Q5 = MPS6514
Q6 = MJE520
IC-1 = 7476

D1 = IN4002
D2 THRU D9 = IN4154
D10 = 5.6 V. ZENER

TEN-TEC, INC.
MODEL KR5-A
8-78

TEN-TEC INSTRUCTION SHEET
MODEL KR5-A

UNPACKING

Carefully remove your KR5-A from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary, they come in handy. Make sure that you have not overlooked anything.

GENERAL

The KR5-A is a solid state, integrated circuit electronic keyer incorporating a reed relay as the actual keying component. It can be used to key all grid-blocked keying systems as well as many cathode keyed transmitters, limited as outlined later by the 15 volt-amp. contact rating. For high current keying circuits, the KR5-A can key an intermediate power relay. Because of the extremely low contact resistance of the reed relay when closed, (not possible with solid state switches), this keyer is ideally suited to key very low impedance and/or low voltage keying lines, such as those encountered in transistorized equipment. The KR5-A features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, an over-ride button switch for transmitter tune-up, QRS sending or emphasis, DC operation from 6 to 14 volts and a plug-in PC board for easy servicing.

SPECIFICATIONS

Keyed Output: Reed Relay; 15 volt-amp contacts, 400 volts, max.
Speed Range: 6 to 50 WPM.
Time Base: Keyed to start with paddle actuation.
Character Generation: Self-completing dits and dahs.
Weighting: Dit length increased app. 10% @ 20 WPM. (Can be changed internally.)
Power: 6 to 14 VDC, 75-140 mA.
Paddle: Single molded plastic with adjustable contact spacing.
Semiconductors: 1 Integrated Circuit, 6 Transistors, 10 Diodes.
Size: HWD 2" X 4" X 6"
Weight: 1 lb, 8 oz.

CIRCUIT DESCRIPTION

Q1, Q2 and Q3 constitute a relaxation oscillator whose frequency is determined by the RC combination of C1, R1 and the setting of the SPEED potentiometer. The oscillator is keyed to the operating state when either the dit or dah contact is grounded, by placing the base of Q2 at ground potential. Diodes D6 and D7 are steering diodes to isolate the paddle contacts from the self-completing circuits once the paddle contact is made.

Output from the relaxation oscillator is applied to the dual flip-flop, IC-1. If a dit is sent, the first section of the flip-flop changes state upon closure of the paddle. The relaxation oscillator remains in the "on" condition because of the low potential applied to the base of Q2 through D2 from output pin 11, of the flip-flop. The high output on pin 10 is applied to the base of Q5, the relay driver, through D3, during this time. With the application of the next timing pulse from the oscillator to the input of the flip-flop, the state of the flip-flop is again changed, back to the original. This turns Q5 off, and opens the reed relay to complete the dit. During the sending of a dit, the second flip-flop is disabled by application of a low potential at pin 3 from conducting Q4. The same procedure is followed for the dah, except that when this contact is closed, the second flip-flop is "set" or enabled by applying a positive voltage to the

"set" terminal, 3 through inverting transistor Q4. Now D2 and D5 alternately keep the oscillator running until the second flip-flop completes its cycle, and D3 and D4 alternately turn on the relay driver transistor.

The outputs from the two flip-flops add to result in a dah. The over-ride switch shunts the collector of Q5 to ground and applies voltage to the reed relay coil. Q6 is a series regulator whose output voltage is determined by the zener diode, D10, in its base circuit. It regulates all input voltages between 6 and 14 volts down to approximately 5 volts, which powers all circuits.

OPERATION

Controls - Front Panel

POWER: Slide switch.
SPEED: Continuously variable between 6 and 50 WPM.
CONTACT SPACING: Thumb screws on paddle assembly. Dah on left side, dit on right side.
OVER-RIDE SWITCH: Touch button located on top lip of case. Momentary contact type.

Connections - Rear Apron

TRANS: This jack is keyed output presenting a short circuit to chassis whenever a character is being sent and an open circuit at all other times. Connect this jack to the transmitter KEY jack. It is advisable to use shielded cable to prevent rf pickup.

SERIES OHMS: Provides resistance in series with key line to prevent relay contacts from welding together. (Zero resistance in full CCW position.)

6-12 VDC: Power input jack. Connect source of DC voltage between 6 and 14 volts. Center pin is positive, chassis is ground.

Reed Relay Contact Protection

Most commercial vacuum tube transmitters and/or transceivers use a form of grid block keying. The voltage present at the key terminals varies from a few volts to several hundred volts. The current being keyed is usually small. The steady state voltage and current are easily handled by the reed contacts. In some transmitters, a capacitor is placed across the key line for by-pass purposes. The energy stored in this capacitor is released across the keyer relay contacts whenever the transmitter is keyed. Depending on the circuit constants, the surge current can exceed the ratings of the contacts, which may result in welded together contacts. Since this is a high impedance circuit, a small resistor can be connected in series with the keyer relay output to limit the transient current surge to a safe value without affecting the operation of the transmitter. The SERIES OHMS control on the rear panel provides this current limiting function. It is a 250 ohm rheostat. For grid block keying transmitters, normal range of this control is from one half to full CCW position. For solid state and low voltage key lines, full CCW to one half rotation is normal. (All TEN-TEC transceivers should use full CCW position.) If keying system of your transmitter is unknown, start with control fully clockwise and reduce resistance until reliable keying and full output are attained. If relay in keyer exhibits contact sticking, increase SERIES OHMS control setting clockwise until reliable keying is achieved.

When cathode keyed transmitters are used with the KR5-A, determine if the volt-ampere ratings are being exceeded by multiplying the key-up cathode voltage by the key-down cathode current. This product should be less than 15 to be within contact ratings. If it is higher, an intermediate power relay should be used, e.g. key-up cathode voltage = 50 volts and key-down cathode current = 200 mA. Product E x I = 50 x .2 = 10 volt-amps. Within ratings.

Over-ride Button Switch

To key the transmitter on continuously, or to send at a speed slower than that set by the SPEED control without changing it, lightly touch the orange disc button switch on the unit. This is a momentary type that requires very little force and displacement. A natural hand position for utilizing this feature is to use the thumb and middle finger for paddle actuation and the index finger for over-ride.

Increasing Maximum Speed

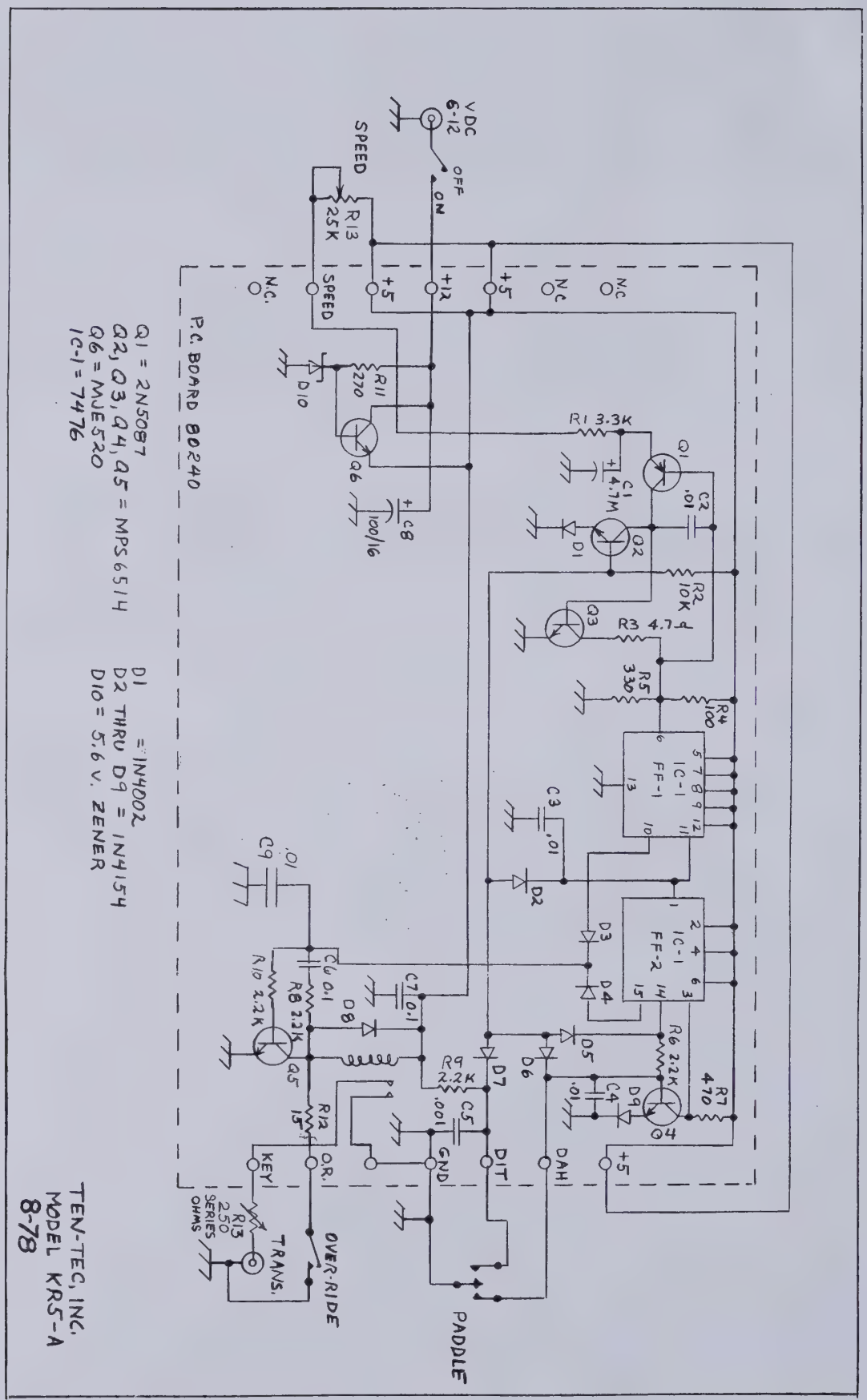
To increase the maximum speed of the KR5-A, replace R1 on the PC assembly with a resistor of lesser value. A 1.8 K resistor will increase maximum speed attainable to approximately 90 WPM. Values between 3.3 K and 1.8 K will adjust highest speed to a value between 50 and 90 WPM. The lowest speed of 6 WPM will not be materially affected by this change. The increased speed range resulting from this modification may be somewhat more difficult to adjust accurately. To compensate for this, you may choose to increase the minimum speed as detailed below.

Increasing Minimum Speed

The minimum speed of the KR5-A may be increased from the nominal 6 WPM as shipped by shunting a resistor across the two active terminals of the SPEED potentiometer, or by replacing the potentiometer with one of smaller resistance value. For example, a 27 K resistor shunted across the SPEED control terminals, or replacing the control with one whose resistance is 15 K, will result in a minimum speed of approximately 9 WPM. Lower resistance values will increase the minimum speed correspondingly. No change will be encountered in the maximum speed with this modification since the control resistance is turned to zero.

Changing Weighting

To remove all weighting so as to result in equal dit and space durations, remove either R8 or C6 from the PC assembly. To lengthen the dit length more than that provided, increase the value of C6. As shipped from the factory, the weighting lengthens the dit length from the classical equal dit and space times by about 10% at 20 WPM. The percentage increases with faster speeds and decreases with lower speeds. Changing C6 from 0.1 to 0.2 mfd will approximately double the percentage. It is recommended that heavy weighting be avoided since articulation will deteriorate somewhat at faster speeds. In no case should C6 be greater than 0.22 mfd.


P.C. BOARD 80240
VDC 6-12
OFF
ON
SPEED
R13 25K
SPEED
N.C.
+5
+12
N.C.
N.C.
+5
R11 270
D10
Q6
C8 100/16
R1 3.3K
Q1
C1 4.7M
C2 .01
D1
Q2
R2 10K
Q3
R3 4.7K
R5 330
R4 100
IC-1 FF-1
C3 .01
D2
C9 .01
IC-1 FF-2
D3
D4
C6 0.1
R10 2.2K
R8 3.3K
Q5
D8
C7 0.1
R9 2.2K
C5 .001
R12 15
D7
D6
D5
R6 2.2K
C4 .01
D9
Q4
R7 470
+5
KEY
R13 250 SERIES OHMS
TRANS.
O.R.
GND
DIT
DAH
OVER-RIDE
PADDLE
Q1 = 2N5087
Q2, Q3, Q4, Q5 = MPS6514
Q6 = MJE520
IC-1 = 7476
D1 = 1N4002
D2 THRU D9 = 1N4154
D10 = 5.6 V. ZENER
TEN-TEC, INC.
MODEL KR5-A
8-78

TEN-TEC INSTRUCTION SHEET
MODEL KR20-A

UNPACKING

Carefully remove your KR20-A from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event that storage, moving, or reshipment becomes necessary, they come in handy. Make sure you haven't overlooked anything.

GENERAL

The KR20-A is a solid state, integrated circuit keyer incorporating a reed relay as the actual keying component. It can be used to key all grid-blocked keying systems as well as many cathode keyed transmitters, limited as outlined later by the 15 volt-ampere contact rating. For high current keying circuits, the KR20-A can key an intermediate relay. Because of the extremely low contact resistance of the reed relay when closed, (not possible with solid state switches), this keyer is ideally suited to key very low impedance and/or low voltage keying lines such as those encountered in transistorized equipment.

The KR20-A features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, an over-ride button switch for transmitter tune-up, QRS sending or simple emphasis, AC and DC operation from either a 117 volt AC line or from 6 to 14 volt DC, a sidetone oscillator, and a plug-in circuit board for easy servicing.

SPECIFICATIONS

Keyed Output:	Reed Relay; 15 volt-ampere contacts, 400 volts maximum.
Speed Range:	6 to 50 WPM.
Time Base:	Keyed to start with paddle action.
Character Generation:	Self-completing dits and dahs.
Weighting:	Dit length increased approximately 10% @ 20 WPM. (Can be changed internally.)
Sidetone:	Sawtooth waveform. Approximately 1 volt peak-to-peak. Frequency approximately 500 Hz, internally changeable. Output impedance 15 ohms..
Power:	105-125 VAC, 50-60 Hz or 6 to 14 VDC @ 125-190 mA.
Semiconductors:	1 Integrated Circuit, 9 Transistors, 13 Diodes.

CIRCUIT DESCRIPTION

Q1, Q2, and Q3 constitute a relaxation oscillator whose frequency is determined by the RC combination of C1, R1, and the setting of the speed potentiometer, R17. The oscillator is keyed to the operating state when either the dit or dah contact is grounded, by placing the base of Q2 at ground potential. Diodes D6 and D7 are steering diodes to isolate the paddle contacts from the self-completing circuits once the paddle contact is made.

Output from the relaxation oscillator is applied to the dual flip-flop, IC-1. If a dit is sent, the first flip-flop changes state upon closure of the paddle. The relaxation oscillator remains in the "on" state because of the low potential applied to the base of Q2 through D2 from output pin 11 of the flip-flop. The high output on pin 10 is applied to the base of Q5, the relay driver, through D3 during this time. With the application of the next timing pulse from the oscillator, the state of the flip-flop is again changed back to the original. This turns Q5 off and opens the relay to complete the dit. During the sending of a dit, the second flip-flop, FF-2, is disabled by application of a low potential to the "enable" pin 3.

The same procedure is followed for the dah, except that when this paddle contact is closed, the second flip-flop is "enabled" by application of a positive voltage to pin 3 through inverting transistor Q4. Now D2 and D5 alternately

keep the oscillator running until the second flip-flop completes its cycle, and D3 and D4 alternately turn on the relay driver transistor. The outputs from the two flip-flops add to result in a dah.

The over-ride switch shunts the collector of Q5 to ground and applies voltage to the reed relay coil.

The side-tone oscillator consists of a unijunction transistor, Q7, feeding the darlington emmitter follower made from the two sections of Q8. The frequency of oscillation, nominally 500 Hz, is determined by the RC time constant of R13 and C9. It is keyed "on" whenever the relay driver is conducting by essentially grounding one of the bases through Q5.

Power for the unit is derived from full wave rectifier, D12 and D13, whenever AC is used, and through blocking diode D11 when DC is used. The resulting input voltage is regulated down to 5 VDC by Q6 and zener diode D10. If both AC and DC power are applied to the unit simultaneously, the unit will automatically be powered from the higher DC source due to the action of D11.

OPERATION

Controls - Front Panel

POWER: Push on-push off type. Operates only in the AC mode. If DC power is used, switch is inoperative and keyer is "on" as long as DC power is applied.
SPEED: Continuously variable between 6 and 50 WPM.
CONTACT SPACING: Thumb screws on the paddle assembly. Dah on left side, dit on right side.
OVER-RIDE SWITCH: Touch button located on top lip of case. Momentary contact type.
PILOT: Indicator for either AC or DC operation.

Connections - Rear Panel

SIDETONE: Phono jack for connection to external headphones, speaker or receiver audio channel.
SERIES OHMS: Provides resistance in series with key line to prevent relay contacts from welding together. (Zero resistance in full CCW position.)
TRANS: This jack is keyed output presenting a short circuit to chassis whenever a character is being sent and an open circuit at all other times. Connect this jack to the transmitter KEY jack. It is advisable to use shielded cable to prevent rf pickup.
6-12 VDC: Power input jack for DC operation. Connect source of DC voltage between 6 and 14 volts. Center pin is positive, chassis is ground.

Reed Relay Contact Protection

Most commercial vacuum tube transmitters and/or transceivers use a form of grid block keying. The voltage present at the key terminals varies from a few volts to several hundred volts. The current being keyed is usually small. The steady state voltage and current are easily handled by the reed contacts. In some transmitters, a capacitor is placed across the key line for by-pass purposes. The energy strored in this capacitor is released across the keyer relay contacts whenever the transmitter is keyed. Depending on circuit constants, the surge current can exceed the ratings of the contacts, which may result in welded together contacts. Since this is a high impedance circuit, a small resistor can be connected in series with the keyer relay output to limit the transient current surge to a safe value without affecting the operation of the transmitter. The SERIES OHMS control on rear panel provides this current limiting function. It is a 250 ohm rheostat. For grid block keying transmitters, normal range of this control is from half to full CW position. For solid state and low voltage key lines, full CCW to one half rotation is normal. (All TEN-TEC transceivers should use full CCW position.) If keying sys-

tem of your transceiver is unknown, start with control fully clockwise and reduce resistance until reliable keying and full output are attained. If relay in keyer exhibits contact sticking, increase SERIES OHMS setting clockwise until reliable keying is achieved.

When cathode keyed transmitters are used with the KR20-A, determine if the volt-ampere ratings are being exceeded by multiplying the key-up cathode voltage by the key-down cathode current. This product should be less than 15 to be within contact ratings. If it is higher, an intermediate power relay should be used, e.g. key-up cathode cathode voltage = 50 volts and key-down cathode current = 200 mA. Product E x I = 50 x .2 = 10 volt-amperes. Within ratings.

Over-ride Button Switch

To key the transmitter on continuously, or to send at a speed slower than that set by the SPEED control without changing it, lightly touch the orange disc button switch on the unit. This is a momentary type that requires very little force and displacement. A natural hand position for utilizing this feature is to use thumb and middle finger for paddle actuation and the index finger for the over-ride.

Increasing Maximum Speed

To increase the maximum speed of the KR20-A, replace R1 on the PC assembly with a resistor of lesser value. A 1.8 K resistor will increase maximum speed attainable to approximately 90 WPM. Values between 3.3 K and 1.8 K will adjust highest speed to a value between 50 and 90 WPM. The lowest speed of 6 WPM will not be materially affected by this change. The increased speed range resulting from this modification may be somewhat more difficult to adjust accurately. To compensate for this, you may want to increase the minumum speed as detailed below.

Increasing Minimum Speed

The minimum speed of the KR20-A may be increased from the nominal 6 WPM as shipped by shunting a resistor across the two active terminals of the SPEED potentiometer, or by replacing the potentiometer with one of smaller resistance value. For example, a 27 K resistor shunted across the SPEED control, or replacing the control with one whose resistance is 15 K, will result in a minimum speed of approximately 9 WPM. Lower resistance values will increase the minimum speed correspondingly. No change will be encountered in the maximum speed with this modification since the control resistance is turned to zero.

Changing Weighting

To remove all weighting so as to result in equal dit and space durations, remove either R8 or C6 from the PC assembly. To lengthen the dit more than that provided, increase the value of C6. As shipped from the factory, the weighting lengthens the dit approximately 10% at 20 WPM. The percentage increase with faster speeds and decreases with slower speeds. Changing C6 from 0.1 to 0.2 mfd will approximately double the percentage. It is recommended that heavy weighting be avoided since articulation will deteriorate somewhat at the faster speeds. In no case should C6 be greater than 0.22 mfd.

Side-tone Oscillator

To lower the frequency of the side-tone, C9 can be increased; to raise frequency, decrease C9. The change will be on a direct ratio, i.e. doubling C9 to 0.2 mfd will result in halving the frequency to about 250 Hz.

AC Line By-Pass Capacitors

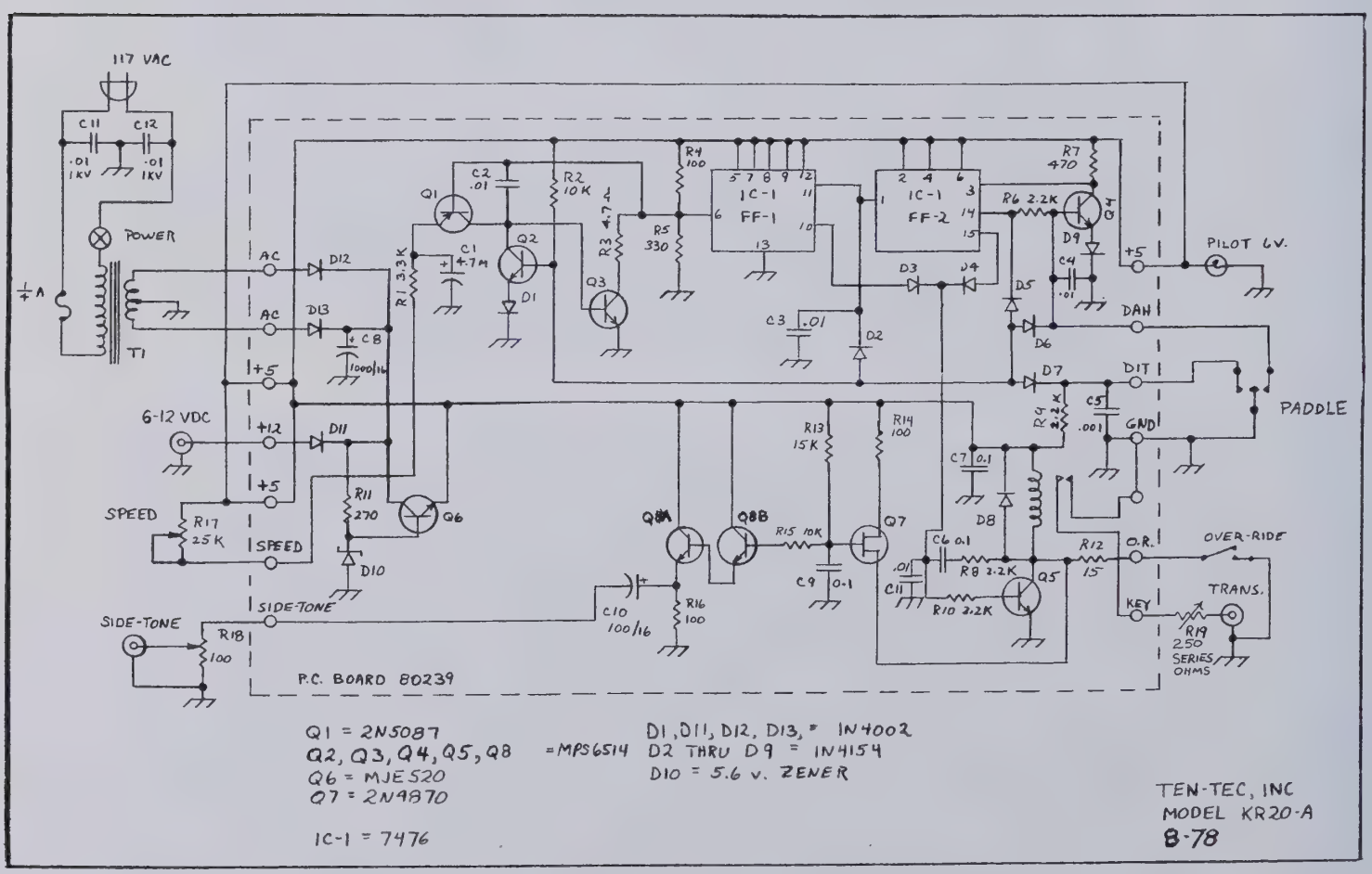
To provide good rf protection to the keyer circuits from possible rf pick-

up on the AC line, both sides of the incoming line are by-passed to keyer chassis with .01 mfd, 1 kV capacitors. Since one side of the AC line is already at a good earth ground, by-passing both input leads assures that the hot side is brought to rf ground, no matter what the polarity is of the line cord plug.

If the common station ground plane, i.e. the chassis system, is not tied to a good earth ground, it will rise to an AC potential of about one half of the line voltage, or to about 55 VAC. This is due to the voltage divider action of the two capacitors. Under these conditions, a slight tingle may be encountered when touching any part of this pseudo ground and the real earth ground that may be present on other equipment in the shack. A lethal shock hazard is neglible since the amount of current that can be drawn through the high impedance of the .01 mfd capacitor is very small. But the presence of this tingle should alert you to the fact that your grounding system is not the best. IT IS ALWAYS GOOD PRACTICE TO TIE THE STATION CHASSIS SYSTEM TO A GOOD EARTH GROUND. Under these conditions, there will be no potential difference between units and the tingle and shock hazard will not be present.

Fuse Replacement

The primary AC circuit of the KR20-A is protected with a 1/4 ampere, slo-blo fuse that is permanently wired in the unit. Should it need replacing, remove the top and left side panel. Clip out the old fuse and replace with an exact duplicate, or use an adapter and leadless fuse clipped to the burned out fuse. Adapters are available from any parts distributor.



Q1 = 2N5087
Q2, Q3, Q4, Q5, Q8 = MPS6514
Q6 = MJE520
Q7 = 2N4870

IC-1 = 7476

D1, D11, D12, D13, = IN4002
D2 THRU D9 = IN4154
D10 = 5.6 v. ZENER

TEN-TEC, INC
MODEL KR20-A
8-78

TEN-TEC INSTRUCTION SHEET
MODEL 226 CRYSTAL CALIBRATOR

GENERAL

The TEN-TEC Model 226 crystal calibrator is an accessory which provides accurate determination of the received operating frequency. It inserts highly accurate signals every 25 kHz into the receiving antenna circuit. These signals are derived from a crystal oscillator that is factory set to zero beat with WWV. An integrated circuit divides the 3.2 MHz signal by 128 to produce the 25 kHz signal which contains harmonics that extend above 30 MHz. It is these harmonics that are received and tuned to zero beat to determine the accuracy of the VFO dial scale.

To easily identify the calibrator signal on a crowded band, the output is pulsed approximately 3 or 4 times a second. This rate can be adjusted by R1. Also, a push-on-push-off switch is provided on the front panel to turn the calibrator off during transceiver operation.

INSTALLATION

1.) Remove the top cover of the ARGOSY transceiver by removing the 4 screws securing it. Carefully remove the top and set it aside.

2.) Insert 3 retainers into the Model 226 circuit board from the top. Push 3 spacers over the retainers from the bottom. Insert 3 sheet metal screws through the retainers (refer to figure 1).

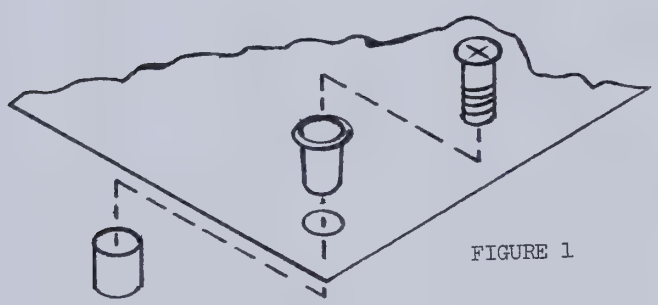
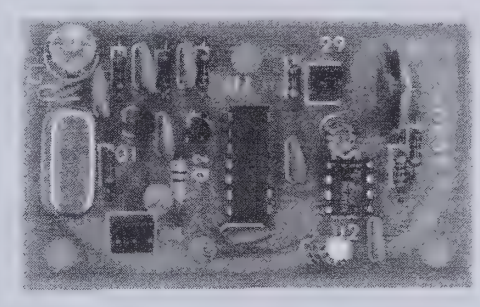


FIGURE 1



3.) The 226 mounts in the front left corner of the ARGOSY. Place the Model 226 in this area aligning the sheet metal screws with the holes in the chassis. Make certain that connector #44 is on the right hand side of the circuit board.

4.) Tighten all sheet metal screws.

5.) Plug the existing cable into the socket provided on the 226. The additional coax cable plugs between the crystal calibrator connector #29 and connector #29 on the RF mixer board assembly.

6.) Turn the transceiver on and check for proper calibrator operation.

7.) Replace the top and tighten the four screws.

OPERATION

1.) With the transceiver tuned to approximate frequency desired, tune the dial to the closest 25 kHz marker that is 0, 25, 50 or 75 on the scale. The pulse calibrator signal should be heard near this position. (Use the broadest selectivity position, for calibration purposes so that the zero beat will be easily discernable.)

2.) Tune the receiver so that the pulse signal is nulled to zero audio beat. Readjust the dial scale, so that the indicated reading corresponds to the proper frequency mark that is 0, 25, 50 or 75 kHz.

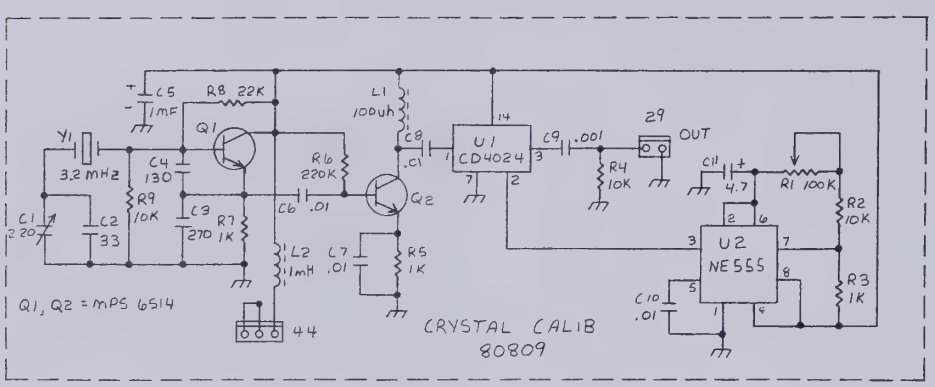
3.) Turn the calibrator off when operating normally.

THEORY OF OPERATION

Transistor Q1 is a Colpitts crystal controlled oscillator operating with the crystal at 3.2 MHz. Transistor Q2 is a buffer which drives the integrated circuit divider U1. U1 divides the 3.2 MHz signal by 128 producing an output of 25 kHz. This output is very rich in harmonics which can be heard all the way up to 30 MHz. U2 is an astable multivibrator operating at approximately 3 Hz. The output of this oscillator is used to gate the divider producing a pulsed output. The frequency of these pulses can be adjusted with thumb pot R1. The calibrator is aligned at the factory. If realignment becomes necessary, proceed as follows:

1.) Turn the band switch to 10 MHz and the dial to 10.000 and tune in WWV. Wait until the announcement occurs and tune the voice for maximum clarity.

2.) Turn the calibrator on and adjust C1 carefully to remove any trace of the audio beat note.



U1

PIN	VOLTAGE
1	1.0
2	DNM
3	DNM
4	DNM
5	DNM
6	DNM
7	0
8	0
9	DNM
10	0
11	DNM
12	DNM
13	0
14	7.35

U2

PIN	VOLTAGE
1	0
2	DNM
3	DNM
4	7.35
5	4.85
6	DNM
7	DNM
8	7.35

DNM - DO NOT MEASURE PULSES ARE PRESENT

PARTS LIST

L2	21007	CHOKE-RF, 1 MHY
L1	21060	CHOKE-RF, 100 UH, 100 MA
C6-8,10	23132	CAP-FXD, .01MF, 100V, CER
C9	23133	CAP-FXD, .001MF, 500V, CER, 10%
C4	23155	CAP-FXD, 130PF, 500V, 5%
C1	23168	CAP-VAR, 3/22PF, TRIMMER, VERT
C5	23181	CAP-FXD, 1MF, 50V, EL, VERT
C11	23188	CAP-FXD, 4.7MF, 25V, EL, VERT
C2	23192	CAP-FXD, 33PF, 100V, 5%, CER
C3	23201	CAP-FXD, 270PF, 5%, 100V
Q1,2	25054	TRANSISTOR - MPS6514
U2	25076	IC-NE555
U1	25103	IC MC14024 BCP
R1	30198	RES-VAR, 100K, LIN, PC VERT, 30%
Y1	48056	CRYSTAL-QUARTZ, 3.2 MHZ, HC-33/U

TRANSISTOR	COLLECTOR	BASE	EMITTER
Q1	7.35	2.20	1.50
Q2	7.35	2.36	1.80

To Key
Black - GND
Yellow - Dash
Red - Dits

TEN-TEC Model 679 Century Keyer Kit was designed specifically for use with the Century/22 transceiver. This optional accessory is installed within the transceiver and provides electronic keying of the transmitter when used with an external paddle. The circuit features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, a speed range between 6 and 50 words per minute and easy installation.

To Transmitter:
White to Key
Red To 12VDC

INSTALLATION

1. Remove both top and bottom covers from the Century/22. Four screws, located on the side surfaces, secure each section.

2. Remove the two plug buttons that cover the 3/8" holes in the back panel of the transceiver that are designated SPEED and PADDLE.

3. Place a lock washer on the phone jack supplied with the kit and insert jack into the hole marked PADDLE. Secure with the 3/8" flat washer and hex nut so that the small corner flat on the body of the jack is up and parallel to the chassis.

4. Place a lock washer on the potentiometer bushing and insert the control in the hole marked SPEED. Secure with a hex nut so that the terminals are facing the phone jack just installed. Note that one lug of the control has been clipped off.

5. Cut the hook-up wire supplied with the kit as follows:

Qty.	Color	Length in inches.
1	Yellow	2
2	Yellow	3
1	Yellow	10
1	Black	2
1	Black	10
1	Red	2
1	Red	10

Strip both ends of all leads 1/8". Twist the three 10" leads together to form a cable.

6. Install the Model 679 printed circuit assembly on the three unused standoffs on the chassis top that surround the label designating the location of the Model 679. Use the three 6-32 machine screws provided to secure the assembly. The orientation of the PCB should be such that the edge containing the five terminal pins runs closest to the back panel of the transceiver.

7. Connect and solder the 2" black lead between the top lug (GND) of the phone jack and the center terminal of the set of three terminals to the left of the mounting screw.

8. Connect and solder the 2" red lead between the left lug on the jack to the left most terminal on the PCB. Also connect and solder the 2" yellow lead between the right jack lug and the remaining terminal of the set of three.

9. Connect the two 3" yellow leads between the SPEED control lugs and the two terminals to the right of the mounting screw.

10. Install the 10" twisted cable to the remaining set of three terminals on the PCB as follows: The black lead to the center terminal, the yellow to the left terminal and the red to the right terminal.

11. Route the cable through the plastic grommet in the center of the chassis to the bottom section, and then toward the rear panel and the three jack phono connector. Connect the black lead to one of the GND lugs on this connector, the yellow lead to the terminal on the jack marked KEY and the red to one of the 12 VDC AUX jacks.

12. Finally, install the knob supplied to the shaft of the SPEED control.

To check operation of the keyer before replacing the covers, turn the transceiver upright and connect power cable. Set DRIVE control fully counterclockwise. Insert the paddle plug into the PADDLE jack. (Connections of the

Turn power on and check operation of the keyer. Check speed range also. Replace top and bottom covers.

NOTE: An alternate keyer, straight key or keyboard can still be used with the Century/22 just by connecting it to either the front KEY jack or the phono connector jack on the rear panel marked KEY. Actuation of either will key the transmitter without having to disconnect the unused keyer.

INCREASING MAXIMUM SPEED

To increase the maximum speed limit from the factory setting of 50 WPM, replace R2 on the PC assembly with a resistor of lesser value. A 1.8 K resistor will increase the maximum speed attainable to approximately 90 WPM. Values between 3.3K and 1.8K will provide maximum speeds between 50 and 90 WPM. The lowest speed of 6 WPM will only slightly be increased by changing R2. The increased speed range resulting from this modification may somewhat reduce the ease of setting the control to the desired speed. To compensate for this, you may want to increase the minimum speed as detailed in the next paragraph.

INCREASING MINIMUM SPEED

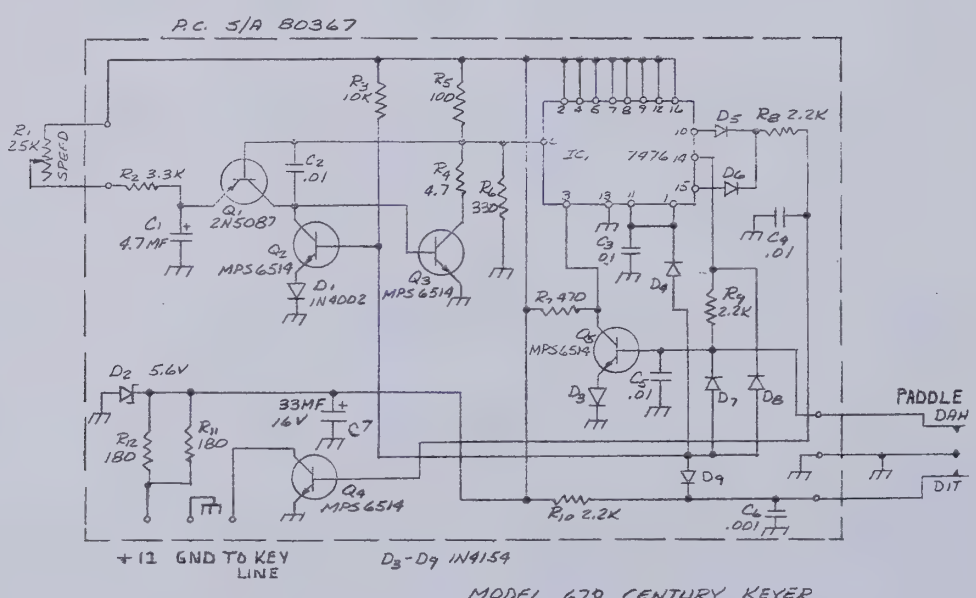
The minimum speed attainable can be increased from 6 WPM by bridging a resistor across the two active terminals of the SPEED control R1, or by replacing the control with one of smaller total resistance. For example, a 27K resistor shunted across the control, or a 15K potentiometer, will increase the minimum speed to approximately 9 WPM. Lower resistance will further increase the minimum speed limit. This modification has no effect on the maximum speed limit since the control is completely out of the circuit when fully clockwise.

REMOVING WEIGHTING CIRCUIT

To remove all weighting so that dit and space durations are equal, replace C4 with a .001 mfd capacitor. It is not recommended that weighting be increased above the factory set level because articulation (readability) of the code will deteriorate, especially at the higher speeds.

LEFT-HANDED CW OPERATORS

If you wish to switch the dit and dah paddles, either change the connections in the paddle connector or the red and yellow wires between the PADDLE jack and the PCB.



MODEL 679 CENTURY KEYER

TEN-TEC MODEL 297
NOISE BLANKER FOR SCOUT TRANSCEIVER

GENERAL

The Model 297 Noise Blanker is designed to be used with the SCOUT transceiver, Model 555. It is a pulse type blanker and is easily installed with three screws and three cables.

The Noise Blanker is activated by the lower position (N.B.) of the TUNE/N.B. toggle switch located in the right bottom corner of the front panel. It is the left most toggle switch of the three.

PARTS LIST

Before installation, be sure these parts are included:

3 - 4-40 screws
3 - #4 lockwasher
1 - #18 coax cable
1 - #42 cable
1 - #8 cable

INSTALLATION

- Remove the TOP and BOTTOM covers of the SCOUT.
- Locate the RECEIVER CONTROL Board (81644) on the top.
- Locate the open area on the right side of the RECEIVER CONTROL Board. The number 81697 should be screened here. See page 3-2 in the SCOUT manual for reference.
- Using the three supplied screws, install the Noise Blanker board, aligning the three holes with the standoffs.
- Install the three cables #18, #42, & #8 in the Noise Blanker board on the same numbered connectors.
- Plug cable #18 into the coax connector #18 on the left rear edge of the RE CEIVER CONTROL board.
- Plug cable #8 into the RECEIVER CONTROL Board connector #8, next to connector #9.
- Route cable #42 behind the RECEIVER CONTROL Board to the underside of the radio and then turn the radio over. Plug cable #42 into connector #42 located on the LOW LEVEL DRIVER Board (81645) next to connector #43.
- Install TOP and BOTTOM covers on the SCOUT.
- Installation complete.

The I.F. signal plus noise is available from connector 18 on the Receiver Control Board (81644). The signal and noise are amplified, separated and the detected noise pulse is applied to the noise blanker gate located on 81644.

OPERATION

U1 and U2 amplify the signal and noise. Q1, Q2 develop an agc voltage that is applied to the amplifier stages keeping them in the linear region of amplification. Q1, Q2 are also configured to separate the noise pulse from the signal. R12, C13 form a very slow attack agc time constant. This will not allow the noise to develop an agc voltage. A signal that is present for any length of time will develop an agc voltage and reduce the gain of the amplifiers. The constants in the agc circuit set the level of a steady state signal, at the output pin of U2, so that it will be just below the point of conduction in Q3. Any noise pulse riding on the signal will drive Q3 into conduction. C14 removes any residual RF and provides the noise pulse to Q4, Q5.

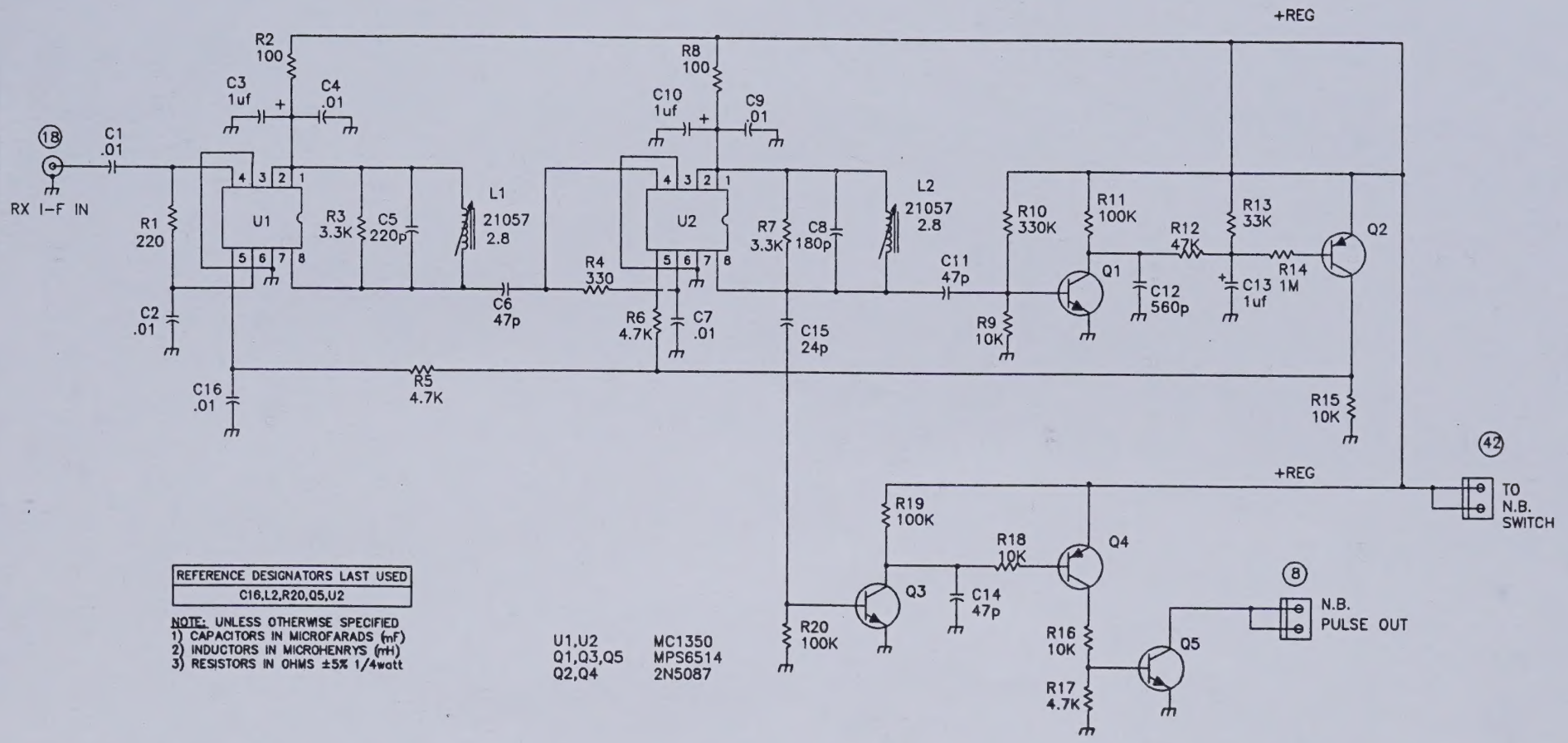
ALIGNMENT

Connect an oscilloscope to the collector of Q3. Apply a very small noise pulse to the antenna and tune L1/L2 for maximum noise pulse as indicated on the scope.

PART #74238 12/17/93

TEN-TEC, INC.
1185 Dolly Parton Parkway
Sevierville, TN 37862
U.S.A.

Switchboard.....615-453-7172
Customer Service.....615-428-0364
FAX.....615-428-4483


+REG
R2
100
R8
100
C3
1uf
C4
.01
C10
1uf
C9
.01
18
C1
.01
RX I-F IN
U1
U2
R1
220
R3
3.3K
C5
220p
L1
21057
2.8
L2
21057
2.8
R7
3.3K
C8
180p
R10
330K
R11
100K
R12
47K
R13
33K
Q2
Q1
R14
1M
C12
560p
C13
1uf
C11
47p
R4
330
C6
47p
R6
4.7K
C7
.01
C15
24p
R9
10K
C2
.01
C16
.01
R5
4.7K
R15
10K
42
+REG
TO
N.B.
SWITCH
R19
100K
R18
10K
Q4
Q3
C14
47p
8
N.B.
PULSE OUT
R20
100K
R16
10K
Q5
R17
4.7K
REFERENCE DESIGNATORS LAST USED
C16,L2,R20,Q5,U2
NOTE: UNLESS OTHERWISE SPECIFIED
1) CAPACITORS IN MICROFARADS (mF)
2) INDUCTORS IN MICROHENRYS (mH)
3) RESISTORS IN OHMS ±5% 1/4watt
U1,U2 MC1350
Q1,Q3,Q5 MPS6514
Q2,Q4 2N5087